ENGINEERING NEWS-RECORD

Japanese conquer 'impossible' dam site p. 38

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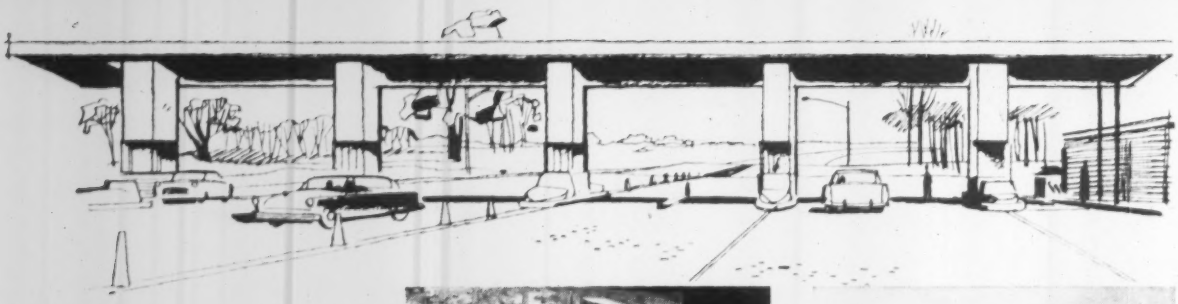

In a variety of corrosive highway services WROUGHT IRON provides longer life

The unprecedented traffic volume in recent years has made it imperative that materials used in highway construction provide long, uninterrupted service. Aware of this "durability-requirement," more and more highway officials and engineers are specifying wrought iron for corrosive highway services.

The selection of wrought iron products is supported by the material's proved record of durability in corrosive services. The photographs illustrate a few of the many corrosive highway applications in which wrought iron is providing extra "mileage" in the form of longer service life at lower cost per year.

We would like to send you our booklet, *Wrought Iron for Highway Construction*. It reviews these applications, and explains why wrought iron serves longer, saves more. Write for your copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y.

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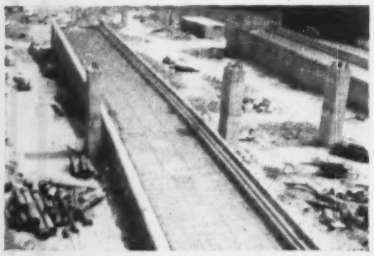
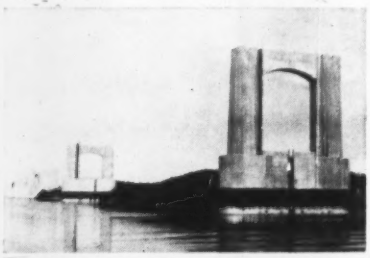


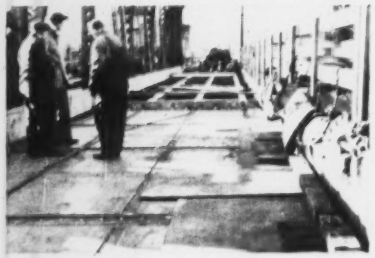
SNOW MELTING SYSTEM
Boston Aerial Highway



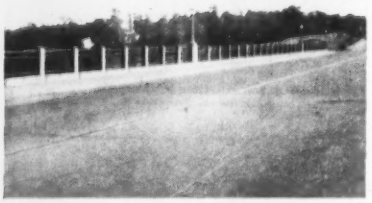
PROTECTIVE PLATES
State Highway Bridge over Illinois River

ELECTRICAL CONDUIT
Thomas A. Edison Memorial Bridge, N. J.

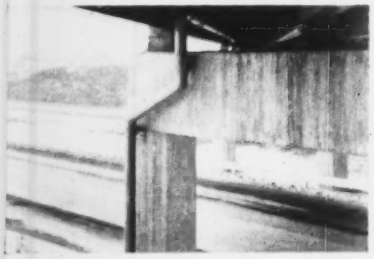
RADIANT HEATING IN TOLL HOUSES
Delaware River Bridge



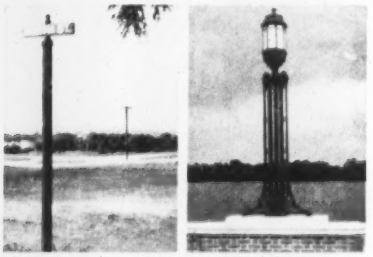
BRIDGE DECK PLATES
University Heights Bridge, New York



HAND RAILINGS
Ninth Street Bridge, Washington, D. C.



DRAINAGE LINES
Ohio Turnpike



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"We find these engines have exceptionally long life and give excellent performance with a minimum amount of attention."

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Amis Construction Co. bought their first Murphy Diesel years ago as original equipment on a shovel. Mr. Bullard says of this engine, *"We were very well pleased with the economy of operation and rugged dependability of this original Murphy engine and since that time have purchased other Murphys for heavy duty work in our vast operations. We now have them in use as power for rock crushers, generators, shovels and cranes."*

Here is one user's opinion. And the repeat orders remove any doubt as to his sincerity. But don't stop here. Ask other Murphy Diesel owners for their opinions, they are our best salesmen. Then ask your Murphy Diesel Dealer to show you how Murphy Diesel Power will fit into your operation.

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Heavy duty power

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Murphy Diesel Engines and Power Units are available in sizes from 96 to 264 H.P. Engine speeds are 1200 and 1400 rpm. "Packaged" generating units are available with capacities ranging from 64 to 165 K.W.

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Symons FIELD REPORT...

Symons Forms, Shores and Column Clamps Used On 525 Ft. Aqueduct at Streator, Illinois...

to carry a 27-inch pipe across a ravine.

Symons solved the difficult task of setting up to pour concrete around the vitrified tile pipe, averaging 225 pounds per foot. Weight of pipe and poured concrete is over one ton per lineal foot.

Footings 7′ x 7′ and 1′3″ thick were first built for the concrete piers spaced 25 feet apart. Symons Column Clamps were used to form the piers—12″x 24″ at the base, 12″ x 48″ at the top and range in height from 10 to 19 feet.

The aqueduct is 4′3″ wide and four feet high. Symons Forms with steel cross members and 51-inch ties were used to form the sides, which were supported by one set of walers.

Three-quarter inch plywood formed the beam bottom, resting on 4″ x 4″ joists. Girths 4″ x 6″ were spaced every four feet and supported by Symons Safety Shores. Warren & Pragg, Decatur, Illinois, was the architect and Central Ironite Waterproofing Company, Maywood, Ill., was general contractor.

Symons Forms, Shores and Column Clamps can be rented with purchase option, all rentals to apply on purchase price. Symons Clamp & Mfg. Co., 4265 Diversey Ave., Dept. D-6, Chicago 39, Ill.

View showing completed piers and aqueduct

For More Information on FORMS—CLAMPS—SHORES Write for Literature

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EIGHTY-SECOND YEAR OF PUBLICATION

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There has been a lot of talk about Shovel and Crane features in recent months and it is interesting to note that some of those advantages offered on other rigs have been standard on Northwests from the day the first Northwest was built. Hence they have reached a higher standard of perfection. Ball and Roller Bearings on all high-speed shafts, splined shafting, operating mechanism back of the center of rotation, have always been considered good shovel and crane design by Northwest engineers. These comprise just a small part of the many Northwest advantages that bring you the *production plus* that makes money. You should have *all* of them!

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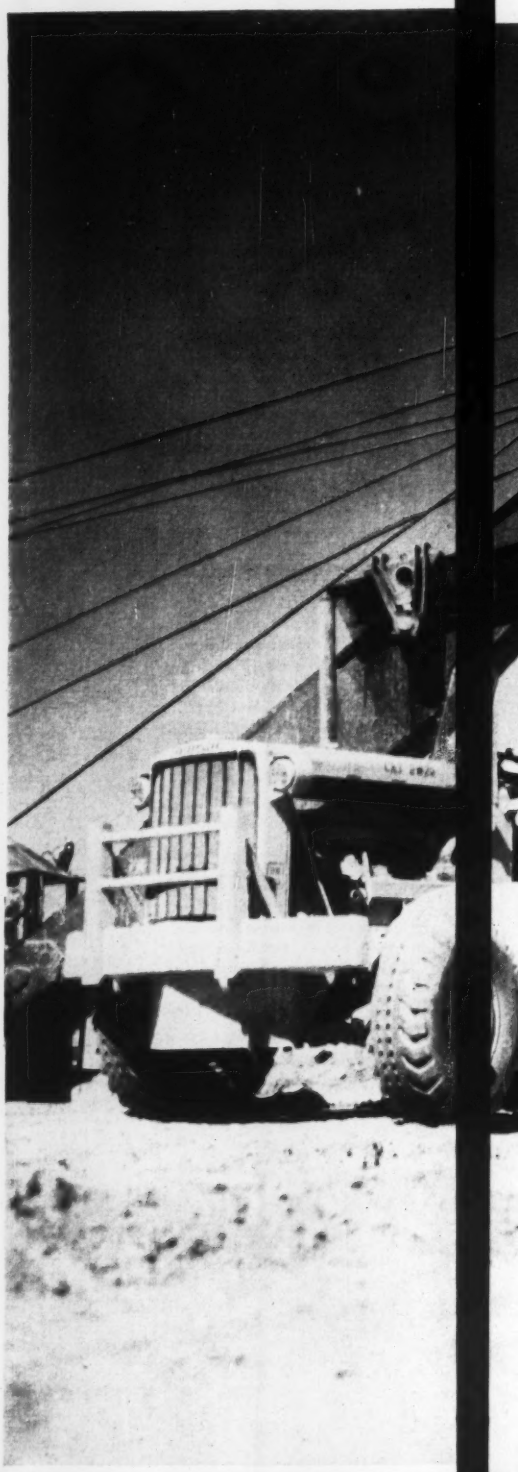
Lighten your maintenance cost load



EVEN in off-highway service, *Texaco Marfak* gives chassis parts full protection. That's because heavy loads won't squeeze it out, bumpy roads won't pound it out. You get long extra life for all chassis parts because of *Marfak's* longer lasting protection against wear and rust.

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More than 625 million pounds of Texaco Marfak have been sold

Also use: *Texaco Track Roll Lubricant* to reduce maintenance costs of your crawler mechanisms. *Texaco Universal Gear Lubricant EP* to assure smooth functioning transmissions and differentials.

Call on Texaco Lubrication Engineering Service for help in simplifying and improving your maintenance lubrication. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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Here's a way to handle *all* major lubrication with *no more than six* Texaco Lubricants. You reduce lubricant inventory, save time and money, assure the right lubricant for every job. It's part of Texaco Lubrication Engineering Service. Ask about it.

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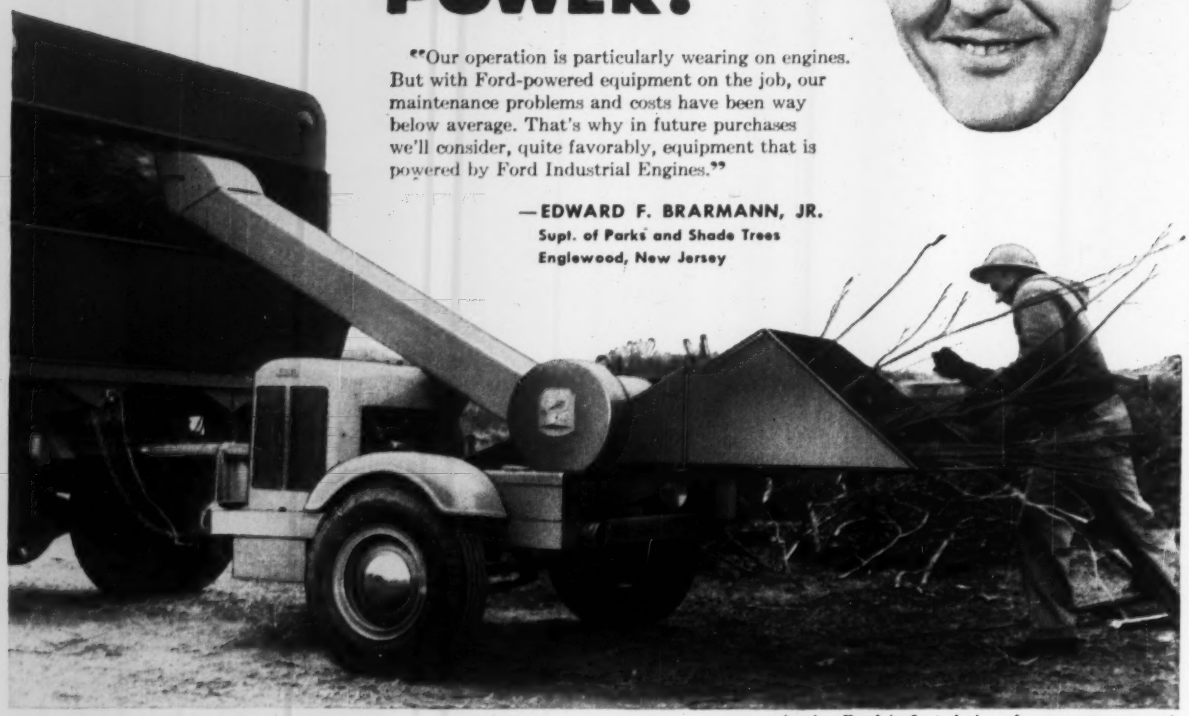
—EDWARD F. BRARMANN, JR.
Supt. of Parks and Shade Trees
Englewood, New Jersey



Again, Ford is first choice where economy counts

Englewood's Park Department now owns a total of six Ford-powered field units. Above, you see one of them in action—a 12″ Asplundh Brush Chipper.

Powered by a Ford "172" Heavy Duty Industrial Engine, this speedy worker takes on branches up to a half-foot in diameter. It eliminates double handling, does away with countless trips to dumping areas and steps up Englewood's brush removal program by an estimated *six times.*

You'll see Ford-powered equipment making short work of similar tasks *everywhere.* And with good reason. For only Ford—in a *full line* of modern overhead-valve 4-, 6- and 8-cylinder gasoline engines—offers the economy of Short Stroke design, the longer engine life of deep-block construction.

Ford Short Stroke design cuts friction, lessens engine wear and releases more *usable* power . . . power that goes to waste in ordinary engines. The benefits of deep-block construction (also available in Ford's new super-efficient 4-cylinder Diesel) are a smoother running, more durable engine—one that requires minimum maintenance even in the toughest going.

Little wonder efficiency-minded power users like Mr. Brarmann are swinging to dependable, low-cost Ford Power. Why not you?

And, to better serve industrial power users, a network of newly-appointed Ford Industrial Products Dealers has been set up across the nation. Now there's a Ford Industrial Power Headquarters in *your* area.

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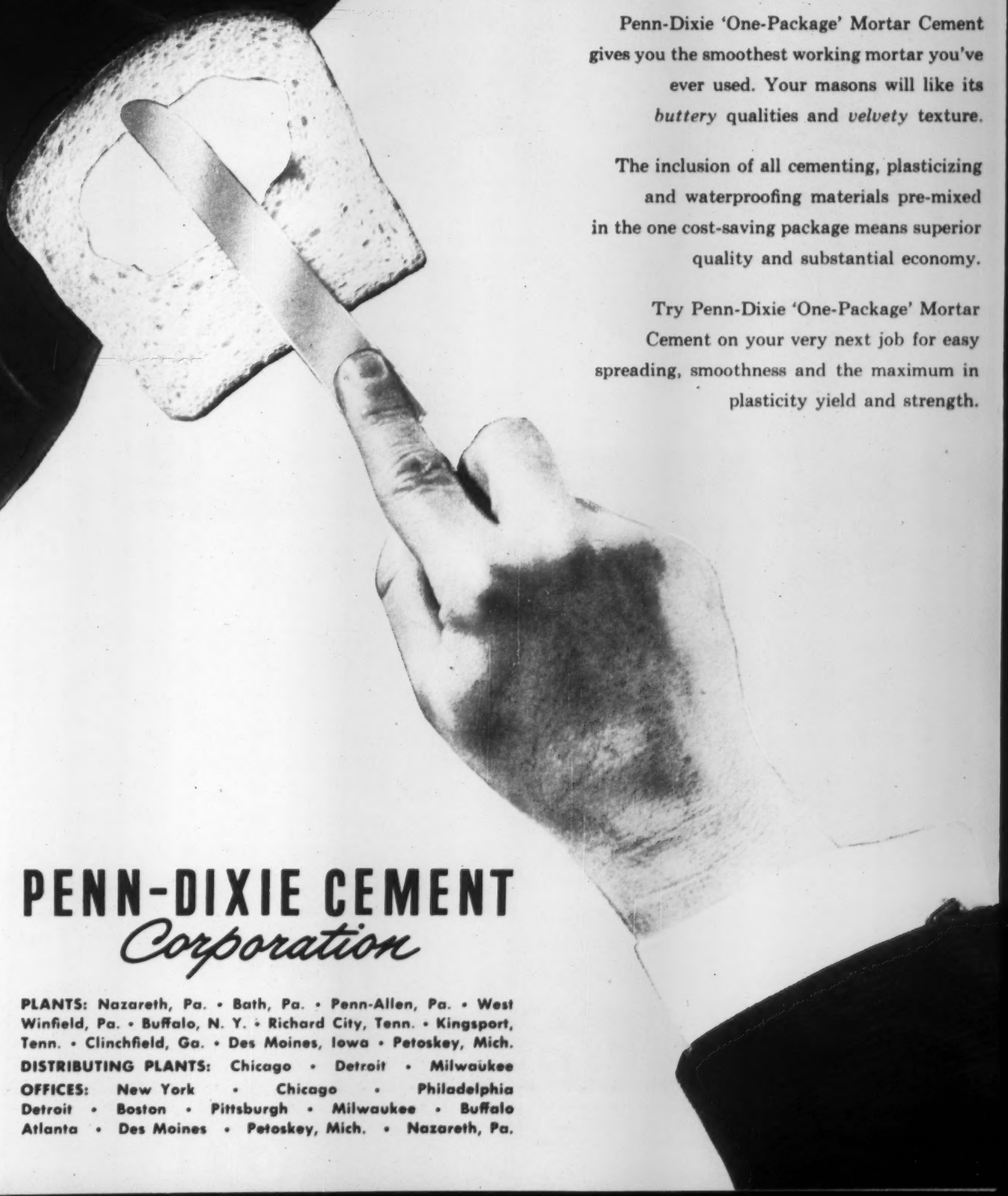

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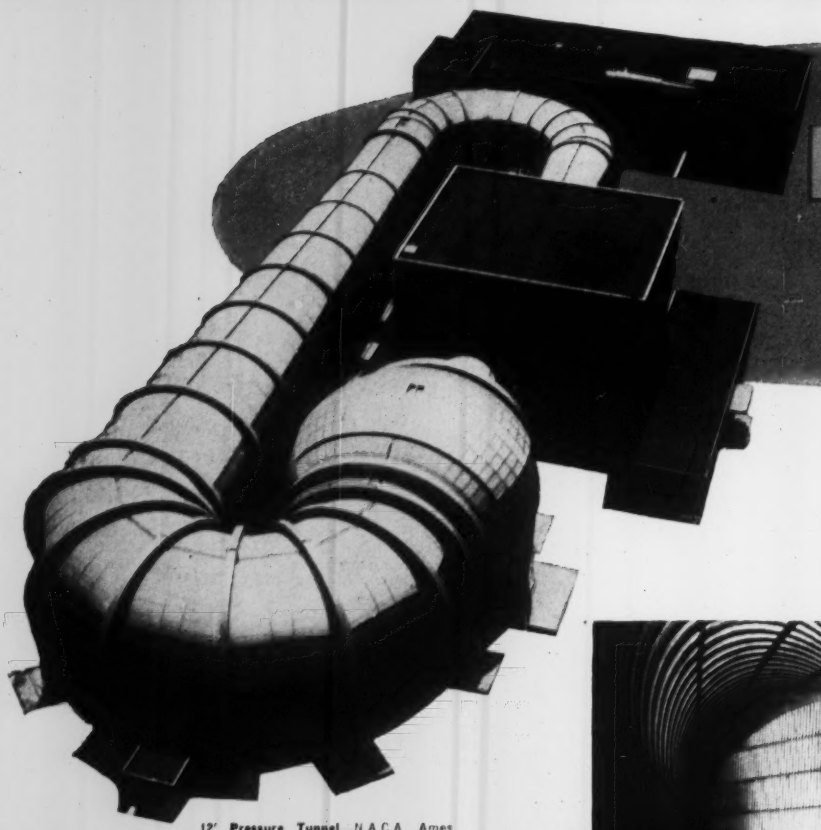
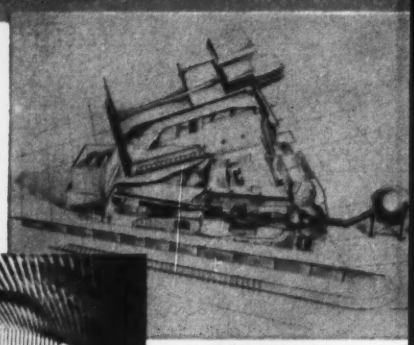
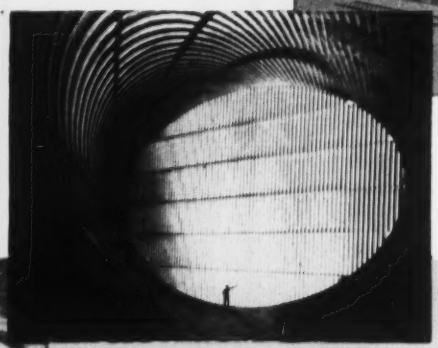
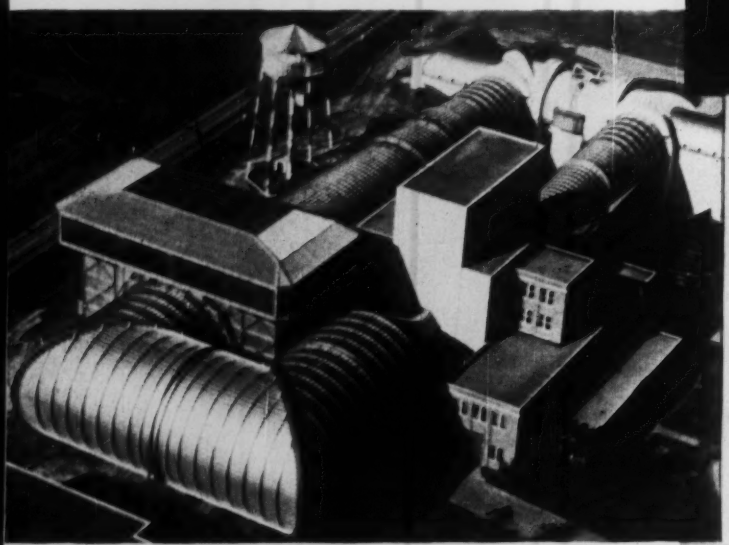


12' Pressure Tunnel—N.A.C.A. Ames Laboratory, Moffett Field, Calif.

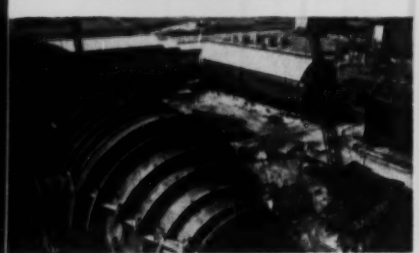


4' x 4' Supersonic Blowdown Tunnel—Under construction for Boeing Airplane Company Seattle, Wash.

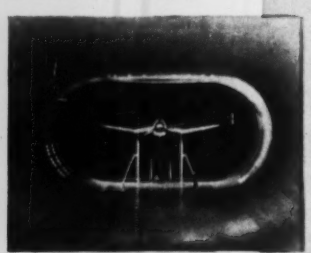




Remodeled 16' Tunnel—N.A.C.A. Langley Aeronautical Laboratory, Langley Field, Va.



16' x 16' Transonic Tunnel—Arnold Engineering Development Center, Tullahoma, Tenn.



40' x 80' Tunnel—N.A.C.A. Ames Laboratory, Moffett Field, Calif.

THE ROLL CALL

Tunnels by PDM

U. S. AIR FORCE
16' x 16' Transonic Tunnel
Arnold Engineering Development Center
Tullahoma, Tennessee

U. S. AIR FORCE
16' x 16' Supersonic Tunnel
Arnold Engineering Development Center
Tullahoma, Tennessee

U. S. AIR FORCE
By-Pass Shell for Compressor, 16' x 16' Supersonic Tunnel
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Intermittent Air Heater for Rom Jet Addition
Arnold Engineering Center
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U. S. AIR FORCE
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Two Supersonic Tunnels
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Wallops Island, Va.

N.A.C.A.
40' x 80' Tunnel
Ames Laboratory
Moffett Field, Calif.

N.A.C.A.
12' Pressure Tunnel
Ames Laboratory
Moffett Field, Calif.

N.A.C.A.
1' x 3' Supersonic Tunnels
Ames Laboratory
Moffett Field, Calif.

N.A.C.A.
1' x 3' Atmospheric Tunnel
Ames Laboratory
Moffett Field, Calif.

N.A.C.A.
6' x 6' Supersonic Tunnel
Ames Laboratory
Moffett Field, Calif.

N.A.C.A.
Rebuilding 16' Tunnel
Ames Laboratory
Moffett Field, Calif.

N.A.C.A.
20' Low Pressure Low Temperature Tunnel
Lewis Flight Propulsion Lab.
Cleveland, Ohio

N.A.C.A.
7' x 10' Icing Research Tunnel
Lewis Flight Propulsion Lab.
Cleveland, Ohio

N.A.C.A.
8' Supersonic Tunnel
Lewis Flight Propulsion Lab.
Cleveland, Ohio

N.A.C.A.
Unitary Plan Tunnel
Lewis Flight Propulsion Lab.
Cleveland, Ohio

N.A.C.A.
19' Pressure Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

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N.A.C.A.
Two Dimensional Pressure Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
16' Atmospheric Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
7' x 10' Low Speed Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
7' x 10' High Speed Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
Flutter Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
Rebuilding 16' Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
Modification of 7' x 10' H.S. Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
Air Storage System for Blow-Down Facility
Langley Aeronautical Lab.
Langley Field, Va.

N.A.C.A.
Conversion of 19' Pressure Tunnel
Langley Aeronautical Lab.
Langley Field, Va.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
10' Pressure Tunnel
Cambridge, Mass.

CORNELL LABORATORY
12' Pressure Tunnel
Buffalo, N. Y.

BOEING AIRPLANE CO.
4' x 4' Supersonic Blow-Down Tunnel
Seattle, Washington

McDONNELL AIRCRAFT COMPANY
7' x 10' Low Speed Tunnel
St. Louis, Mo.

NORTH AMERICAN AVIATION INC.
7' x 7' Trisonic Blow-Down Tunnel
El Segundo, Calif.

PRATT & WHITNEY AIRCRAFT
18' Engine Testing Tunnel
E. Hartford, Conn.

PRATT & WHITNEY AIRCRAFT
Blow-Down Facility
E. Hartford, Conn.

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2—8' x 10' Atmospheric Tunnels
David W. Taylor Model Basin
Carderock, Md.

U. S. NAVY
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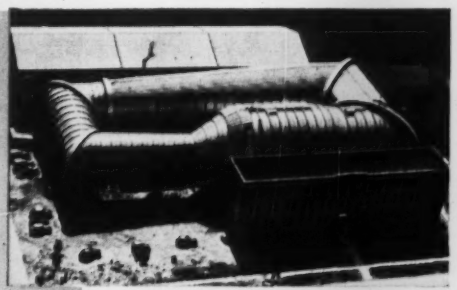
Carderock, Md.

U. S. NAVY
Supersonic Tunnel and Burner Tunnels
Daingerfield, Texas

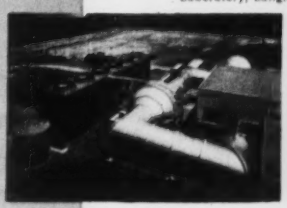
U. S. NAVY
Water Tunnel
Penna. State University
University Park, Pa.

U. S. NAVY
32'5" Diam. Vacuum Sphere for Supersonic Tunnels
David W. Taylor Model Basin
Carderock, Md.

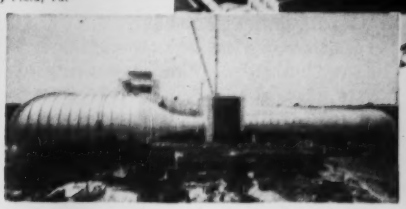
U. S. NAVY
Blow-Down Facility
Daingerfield, Texas



19' Pressure Tunnel—N.A.C.A. Langley Aeronautical Laboratory, Langley Field, Va.



8' x 8' Supersonic Tunnel—N.A.C.A. Ames Laboratory, Moffett Field, Calif.



16' Atmospheric Tunnel—N.A.C.A. Langley Aeronautical Laboratory, Langley Field, Va.

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Reader Comment

Against ACI Code Revisions

SIR—The recently proposed revisions of American Concrete Institute Building Code requirements for reinforced concrete represent a significant forward step in keeping building codes up to date. The ACI is to be heartily commended. However, the sections covering shear and diagonal tension in concrete beams and ultimate-strength load factors for lateral forces have ramifications that need to be clarified.

There has been a need for changes in shear and diagonal-tension requirements for some time. Among the proposed changes is the requirement that the allowable shear be retained at 0.03 f_c' for beams without web reinforcement and that where unit shears exceed this value stirrups shall be provided to resist the excess of two-thirds of the total shear, whichever is greater.

The limiting shear stress for beams without web reinforcement was changed from 0.02 f_c' to 0.03 f_c' at the time that higher bond stress was allowed for A305 reinforcing bars. Bond strength of longitudinal reinforcing is neither the sole nor most important factor in determining the shear strength. It may well be that the increase in allowable shear strength was not warranted.

Beams without web reinforcement have been known to fail by diagonal tension at indicated shears of 0.05 to 0.06 f_c'. The current allowable shear stress of 0.03 f_c' results in some members having a factor of safety for shear failure of less than two. This is a small factor of safety for brittle failure, with the uncertainties of loading, property variations and support settlements.

Furthermore, the average design compressive strength of concrete has about doubled over the past thirty or forty years. Tests show that tensile strength does not increase proportionally with compressive strength. Yet allowable stresses in shear and diagonal tension have not only kept pace with compressive strength but have actually undergone a ratio increase. In effect, the factor of safety for shear and diagonal tension has been progressively decreased through the years.

The parts of the proposed revisions mentioned do not appear to be entirely logical, and no test data have been offered to substantiate them. The subject is a complex one and is being studied extensively by many agencies.

Investigations are now in progress by the ACI-ASCE joint committee on shear and diagonal tension. Inasmuch as provisions, once adopted, tend to become generally accepted, we feel that present uncertainties should be handled by simply lowering the limiting shear stress for beams without web reinforcement until comprehensive requirements for shear and diagonal tension have been fully developed.

The second section that needs further consideration deals with ultimate-strength load factors for lateral forces. There are several implications that have apparently not been considered.

Under the proposed revisions, structures will have to be heavier than now required. First, lateral-force effects in all cases will have to be added to the effects of gravity loads. In the cases of many rigid structures, under present requirements no increase in strength is required because allowable stresses may be increased one third. Second, in the predominant case, where tension steel governs in a building with relatively high lateral load, a load factor approaching 2 might easily be required. Under present requirements, using a yield strength of 40,000 psi and a design stress of 26,700 psi, the effective load factor is about 1.5. We know of no justification for the increase in strength requirements under lateral forces.

A further objection is found in that wind and seismic loads are treated in the same manner. Seismic loads are dependent on many factors, including the very nature of the structure itself. Present design procedures have been born out of experience with buildings in actual earthquakes. The allowable stresses, design loads, and design assumptions, when used together, are producing designs which generally are within the bounds of reason. However, it is not assumed that either the design loads or stresses are necessarily those that will actually exist in the finished structure. It is the end result of the design which is important at the present time. To impose a new procedure to be used with existing design loads is to impose requirements that will give unreasonable results.

We feel that the proposed method, for handling lateral forces in ultimate-strength design, needs considerable additional study before adoption and that the provisions should be omitted at the present time.

The proposed revisions are now in the hands of ACI members for ratification in their entirety, having been published in the ACI Journal only last December.

A nationally recognized building code should reflect as much of the best thinking of engineers throughout the country as possible. To this end, we feel that in the future, changes should be given more time for full discussion before they are adopted. Furthermore, adoption should be done by sections so that further discussion can be had on those sections where serious questions have arisen.

As a group of civil and structural engineers of the San Francisco Bay Area, we submit the above observations and comments in hopes that they will be instrumental in making a good building code an even better one.

OREN L. CHRISTENSEN
FRANK BARON
FRANK E. MCCLURE
T. D. WOSSER, JR.
CHARLES DE MARIA
MARVIN A. LARSON
STANLEY E. TEIXEIRA
JOHN M. SARDIS
San Francisco, Calif.

Engineering News Record welcomes expression of opinion from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance.

Letters should be addressed: Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

Education and Russia

SIR—Contrary to your editorial (ENR March 1, 1956, p. 100) that people are overdoing competition with Russia in the educational field, there are many who feel that we cannot stress it enough. With Russia training 43,000 engineers last year to our 24,000 and with Russia having 25,000 enrolled in their medical schools compared with 7,500 in the United States, the quality of their education does not matter at the moment. Even on this score impartial observers have reported that their technology is good and getting better.

What we should be concerned about is the long pull. Remember, the United States was in the mud a scant one hundred years ago. All the Russians want is time, and in due course they will succeed in their purpose of capturing the minds and markets of the world unless we lick them with education and the training of teachers, scientists and the vast array of practical and cultural products of our colleges and universities.

(*Continued on page 14*)

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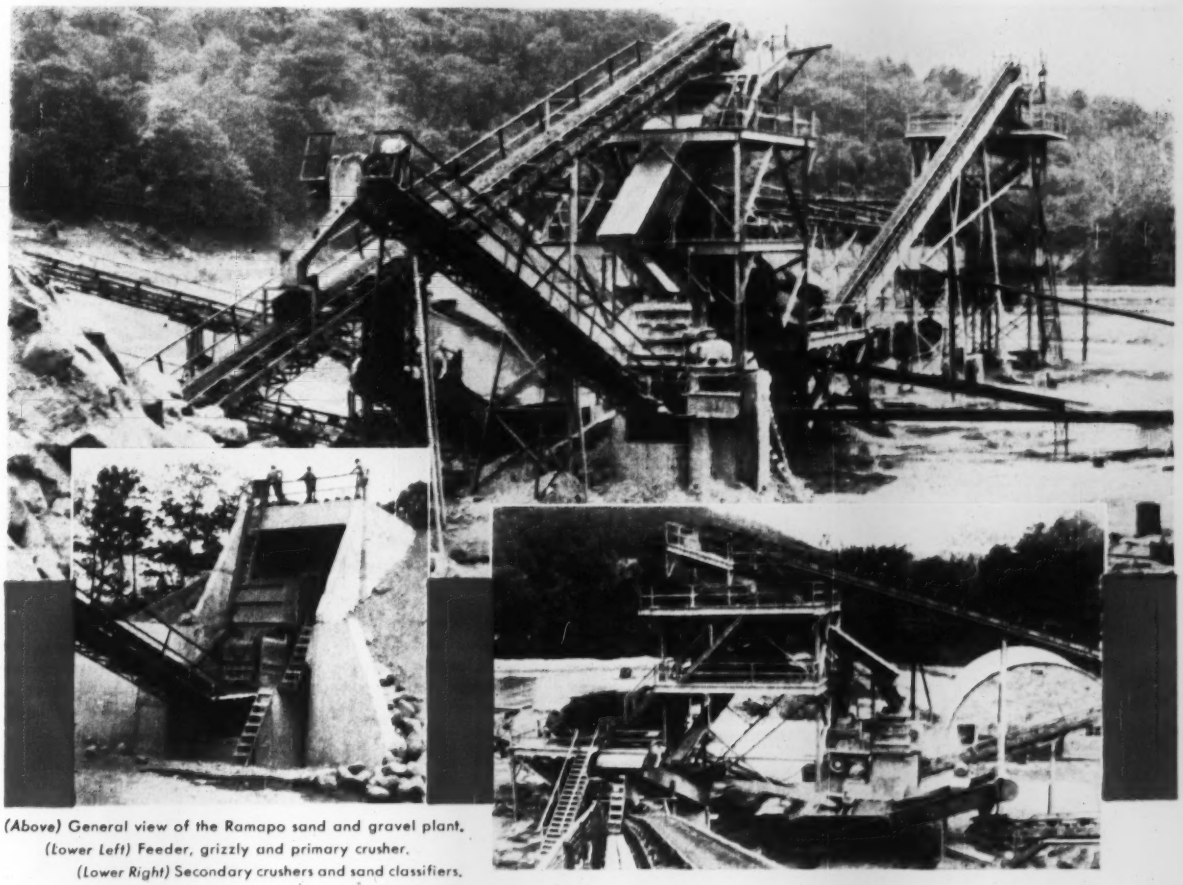

(Above) General view of the Ramapo sand and gravel plant. *(Lower Left)* Feeder, grizzly and primary crusher. *(Lower Right)* Secondary crushers and sand classifiers.

Near the New York Thruway, and close to many other heavy construction jobs, this complete Telsmith plant meets all their aggregate requirements. Built by Ramapo Sand & Gravel Co., Ramapo, N. Y. and designed by Telsmith engineers, it has Telsmith equipment throughout. It makes three sizes of gravel, and concrete and mason sand, all washed. Be sure that yours is a profitable Telsmith plant. Send for Bulletin 266.

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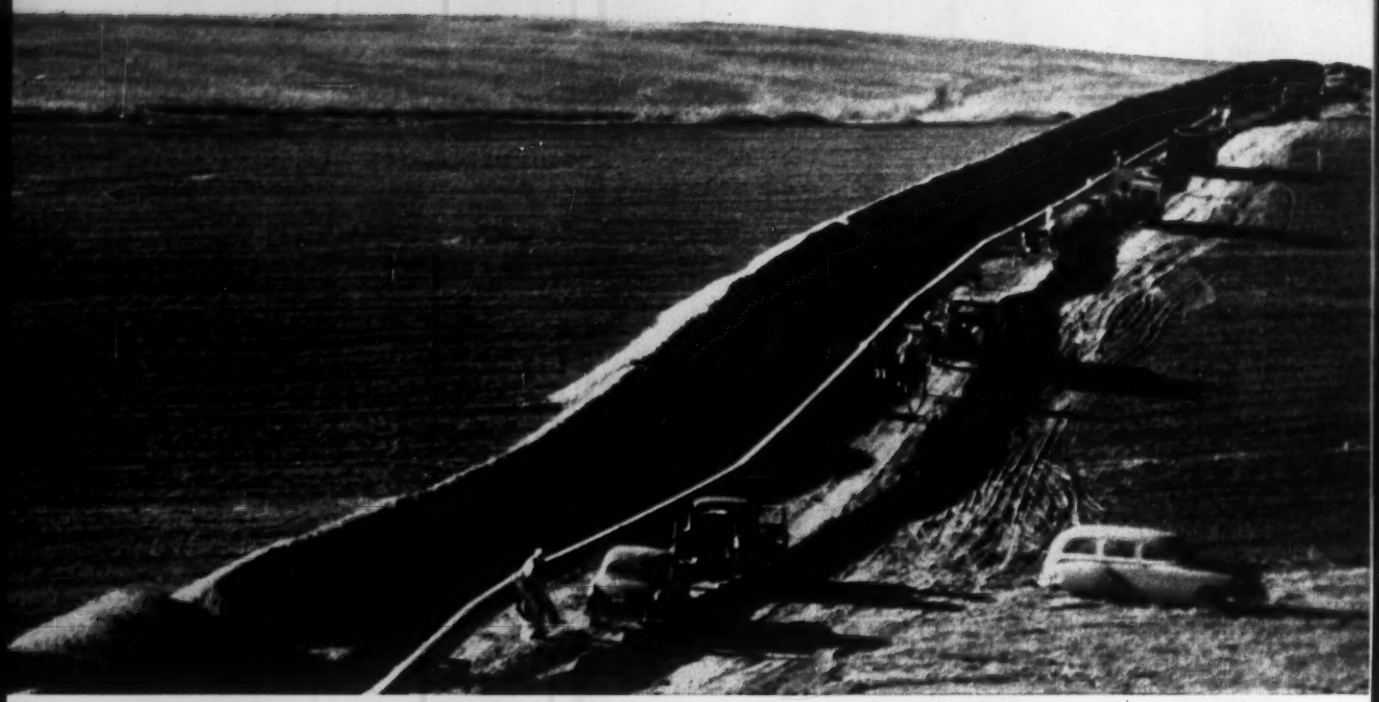

Pipe welders at work on the rolling fields of Kansas.

A watertight pulling dome or "head" welded onto the line in preparation for one of the eight major river crossings.

A section of 24" O.D. x .500" wall National Seamless Pipe, coated for the Solomon River crossing. The covering consisted of a dope primer impregnated with fibre glass paper and coated with two inches of cement.

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The installation of this line brought about a new pipe-laying record—an average of over 10 miles a day. Eight spreads welded as high as 108.6 miles of pipe in one week, and up to 17.4 miles in a single day! This is a tremendous accomplishment in view of the fact that the line passes under 49 highways, countless roads, 21 railroads, eight major rivers, and spans innumerable irrigation ditches.

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A cinch bending machine in operation on a section of National Seamless in the Boyd, Kansas, area.

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SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

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Furthermore, I am sure you appreciate how difficult it is to get support for education. Until our people are alarmed not only by the possibilities of Russian supremacy, but about their neglect of education, we can't expect results. According to the U. S. Department of Commerce, we spent $14 billion last year in the United States on liquor and tobacco and $20 billions on recreation. We spent $9 billions on our public schools. One can be indulged with misgivings that a society which has been led to such a set of comparative values might indeed be a decadent society and inevitably doomed to lose out to a society that believes in education, however stumbling its first efforts may be.

Some of us are crying "wolf, wolf" because we know there is a wolf. If it isn't Russia, it is the supine attitude of our people about adequate support for education.

JOHN B FULLER
Alumni Secretary
The Ohio State University Association
Columbus, Ohio

Low Cost Flood Control

SIR—Frank D. Steiner's letter entitled "Dams Are Not Enough" (ENR Feb. 16, p. 10) is a valuable contribution to the flood control problem. I would like to submit another solution—particularly for the Delaware River Valley but having application over most of the United States.

It is a fallacy to believe that a few costly large concrete dams at the upper end of a main river watershed in conjunction with dredging the channel so that more flood water can be carried off faster is the best method of flood control. Even if the large dams hold back all the waters above them, they hold back no water below them.

The most effective method to reduce flash floods over a large watershed is to build as many small rock dams as practical beginning at the headwaters. This method will utilize the river and small creek basins cut out by ages of erosion to impound or hold back the flash floods and release it over a longer space of time. This basin area is worthless for habitation, while storing the same volume of water behind large concrete dams condemns good farming land.

Most of the dams should be constructed in the winter with quarry rock. Quarry prices are lowest in winter because there is no demand for crushed stone due to roadbuilding, and during winter the ground is frozen so that trucks hauling rock to dam site will not get stuck in soft mud.

Smaller rock dams are built by dumping truck loads of riprap across the stream after corrugated metal or concrete pipe of such size and number have been placed to carry off the normal flow. Precast interlocking slabs of concrete can be laid to form triangular openings. The elevation of the discharge pipes will depend on how much, if any, water is to be impounded for agriculture and wild life.

For larger streams and rivers, rock jetties such as are used along the New Jersey coast—called wing dams when used along the rivers—are the most effective and economical method to retard flash floods. Heavy and durable diabase trap rock should be given preference when economically available; such rock has proven most effective in resisting high velocity hurricane storm waves in ocean jetties. Beside having one of the highest specific gravities, diabase trap rock breaks into interlocking shapes.

These rock jetties or wing dams should extend one-third across the river from each side and, if of proper height, would hold back about two thirds of the flow during flash floods. Both wing dams and small stream rock dams were used on the upper Mississippi River between Wisconsin and Minnesota where they gave good service. Wing dams will cause scouring out of a central channel for navigation, and will create still water near land end for recreation, boating and swimming and fishing piers, and to prevent erosion of the river banks. The dams will catch or impound most of the silt that is carried by flash floods.

Because of variable and unknown factors, many concrete dams have not functioned as calculated. But a rock dam is flexible and can easily be made higher or lower by the removal or addition of rock. And because there would be many small stream rock dams and river wing dams, should one fail, with its low head of water there would be no costly flooding as in the event of failure of a large concrete dam.

Considering the Delaware River Valley, the distance from Port Jervis to Trenton is about 120 mi and the river averages about 600 ft wide. Twenty four rock jetties spaced every five miles and averaging 200 ft long on each side of the river, would hold back two-thirds or more of flash flood waters if of proper height. The dam tops would be 10 ft wide, so that trucks can back out, and 10 ft high with 1:1 side slopes, yielding a 200-sq ft cross-section. This type jetty, averaging about 100 pcf or 10 tons per lin ft, can be constructed for $50 per lin ft or $20,000 for each pair of wing dams for a $480,000 total. They could all be built in a year, and could be removed later.

C. F. MOHR
Civil Engineer
Clifton Heights, Pa.

Bolt Correction

SIR—We appreciated your timely article on the Employment Building (ENR Mar. 1, p. 30). There is one error that should be corrected. High-strength bolts were used only on the trusses over Eighth Street and they had A325 cut washers as recommended by American Institute of Steel Construction. All other connections were made with unfinished bolts (hexagon or square heads) and no washers, using values on p. 271 of the fifth edition of the AISC manual, STEEL CONSTRUCTION.

ANSON BOYD
State Architect
Sacramento, Calif.

CALENDAR

American Water Works Association, Diamond Jubilee Conference, Kiel Auditorium, St. Louis, Mo., May 6-11.

Sixth Highway Transportation Congress, Hotel Mayflower, Washington, D. C., May 8, 9 and 10.

Society of American Military Engineers, 36th annual meeting, Washington, D. C., May 14-15.

Purdue Industrial Waste Conference, Purdue Memorial Union, Lafayette, Ind., May 15-17.

American Institute of Architects, annual convention, Biltmore Hotel, Los Angeles, Calif., May 15-18.

Prestressed Concrete Institute, second annual convention, Hollywood Beach Hotel, Hollywood, Fla., May 16-18.

Society for Experimental Stress Analysis, spring meeting, William Penn Hotel, Pittsburgh, Pa., May 16-18.

Building Research Institute, annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ont., May 21-22.

National Society of Professional Engineers, Ambassador Hotel, Atlantic City, N. J., May 23-26.

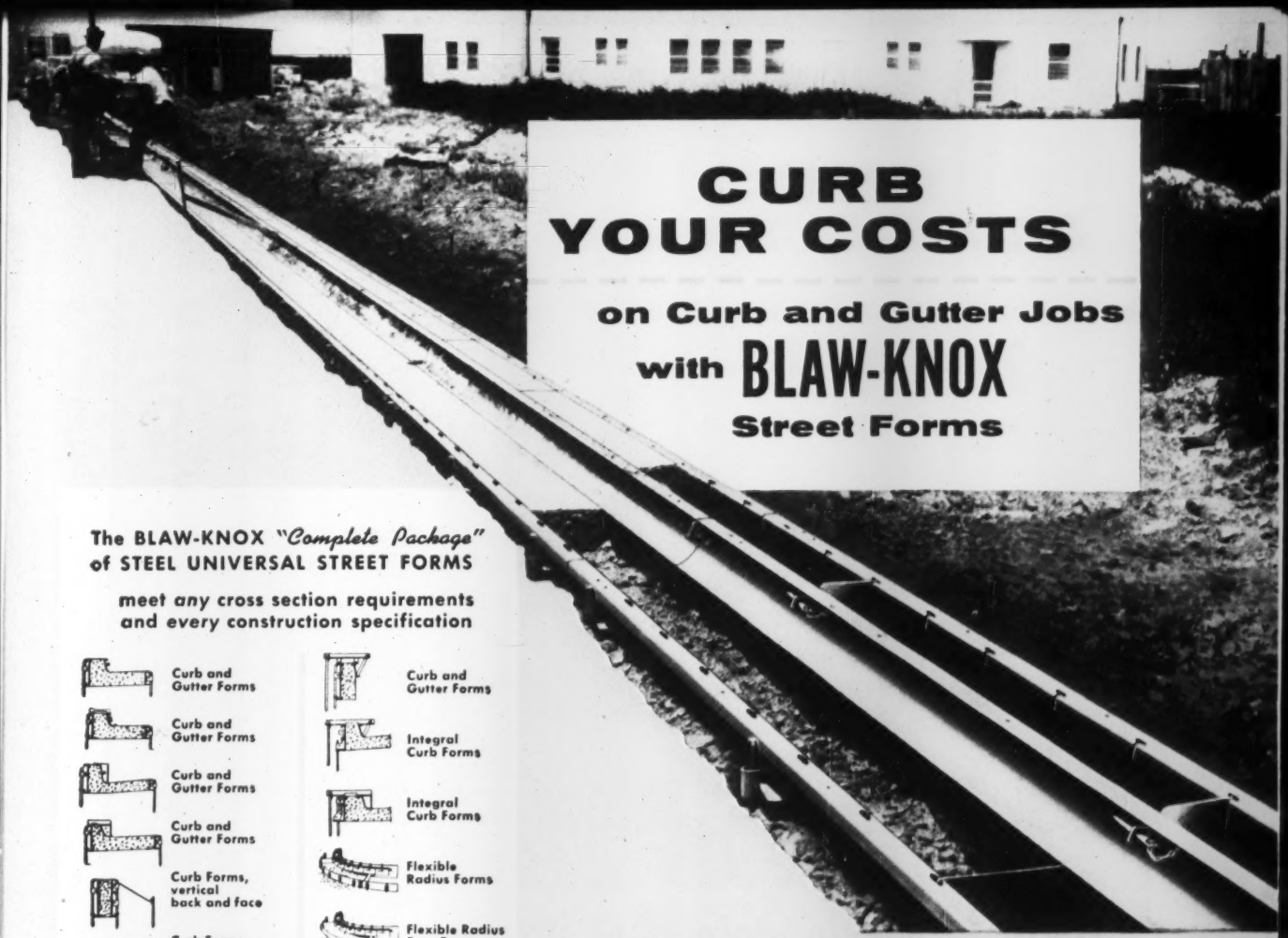
Concrete Reinforcing Steel Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va., May 28-June 2.

American Society of Civil Engineers, Spring convention, University of Tennessee, Knoxville, Tenn., June 4-8.

Materials Handling Exposition, Cleveland, Ohio, June 5-8.

World Conference on Earthquake Engineering, University of California, Berkeley, June 12-16.

American Society of Landscape Architects, 57th annual meeting, Cleveland Hotel, Cleveland, Ohio, June 24-27.



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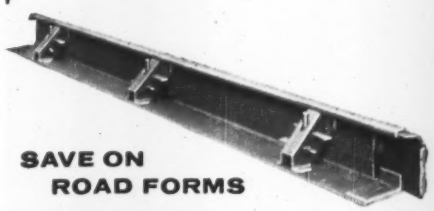

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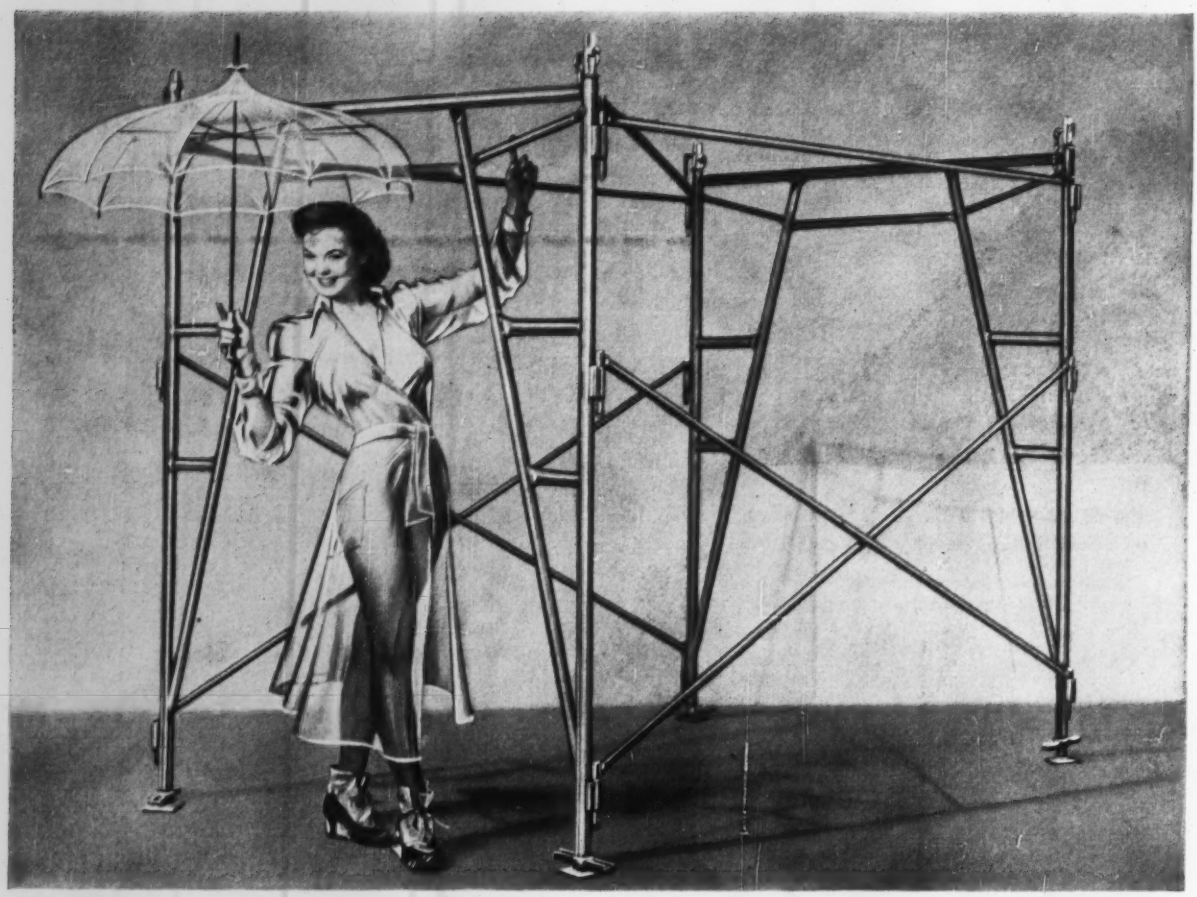

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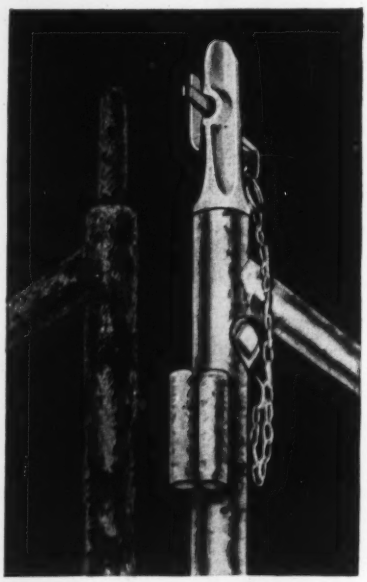

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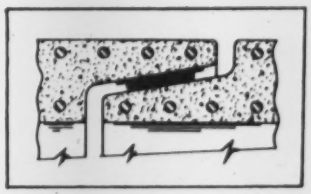

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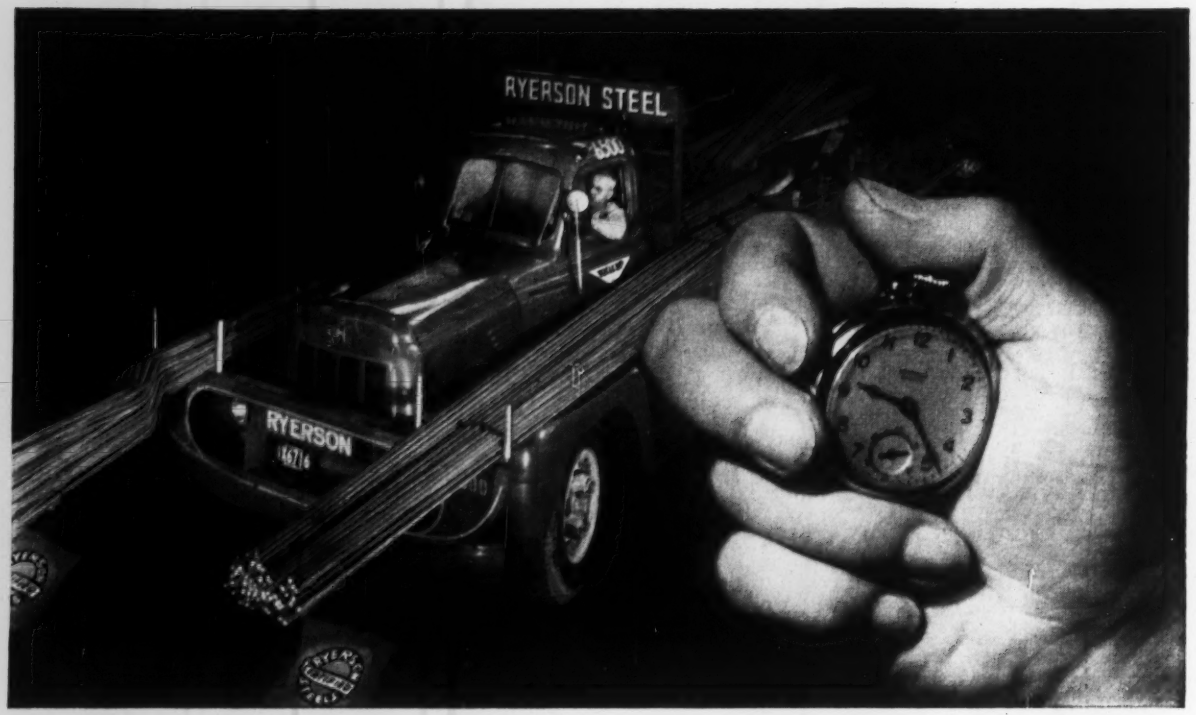

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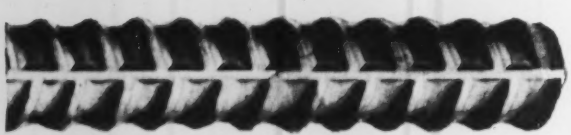

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ENGINEERING NEWS-RECORD

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CONTENTS

NATIONAL AFFAIRS

Free Road Expenditures Up 21% ... 23
Wind Tilts Lift-Slab Garage in Cleveland ... 25
No Asphalt Pavement Failures Found at Airbases ... 26
TV Covers Bolted Steel Frame Erection ... 27
Rapid Transit System Between Philadelphia and N. J. Suburbs ... 28
Lumber Laundry Removes Flood Mud ... 28
Central Water Agency for California ... 29
Upper Colorado Signed Into Action ... 29
Ontario Water Resources Commission Established ... 30
Old Form Hides New Function ... 33
Court Reverses Decision in Fallbrook Case ... 34

FEATURES

Japan's Sakuma Project ... 38
Finding Points on a Vertical Curve ... 47
Folded Plate Roof Spans Big Bays ... 51
Quickest Way Through Baltimore ... 58

NEW PRODUCTS

Clamps Speed Alignment of Form Panels ... 66
Sandwich or Sheet Wall?—It's Either ... 66
Retractable Scarifier for Caterpillar Models ... 69
Increase Horsepower Ratings in Crawler Tractor Line ... 69
Torque Converter Featured in Tandem Roller Line ... 69
Treatment Process Allows Multiple Re-Uses of Forms ... 72
Deck Paint Cuts Skid Risk ... 72
Publications ... 74

INTERNATIONAL

Sandwich Walls Go South of the Border ... 77
Eiffel Tower Competitor ... 78

MEN AND JOBS

Bureau of Reclamation Regional Director Named ... 81
Assistant Director for NAHB ... 81
Unit Masonry Association Names Chairman ... 81
Contractor Group Starts Two Specialty Chapters ... 82

RESEARCH

Sulfite Wastes Into Cheap Feed ... 89
Pretensioned Beam Is Hard to Break ... 89
ASTM Proposes Fly-Ash Standard ... 90
How Overmixing and Tempering Vary Concrete ... 90

BUSINESS AND FINANCE

The Solid-Gold Tractor-Shovel ... 145
Higher Money Costs Hit Construction ... 148
General Cement Shortage Forecast ... 148

LABOR

Federal Inspection of Welfare Funds Proposed ... 156
Beck Meets Meany in Showdown With AFL-CIO ... 156
Canadian Construction Workers in Short Supply ... 156

Reader Comment ... 10
Calendar ... 14
Washington Observer ... 21
Obituaries ... 84
Books ... 94
Legal ... 103
Construction Reports ... 108
Unit Prices ... 136
Materials Prices ... 140
Construction Scoreboard ... 143
Activity This Week ... 143
Editorials ... 172

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THE CONSTRUCTION WEEK

BIGGER AND BETTER—It looks as if a new barometer will have to be devised to measure heavy construction contract volume. This week awards topped $536 million, going over the half-billion marker for the second consecutive week. Moreover, this was the seventh week out of the first 16 weeks of this year that the $500-million mark has been exceeded. The '55 boom included only two such weeks in the entire year.

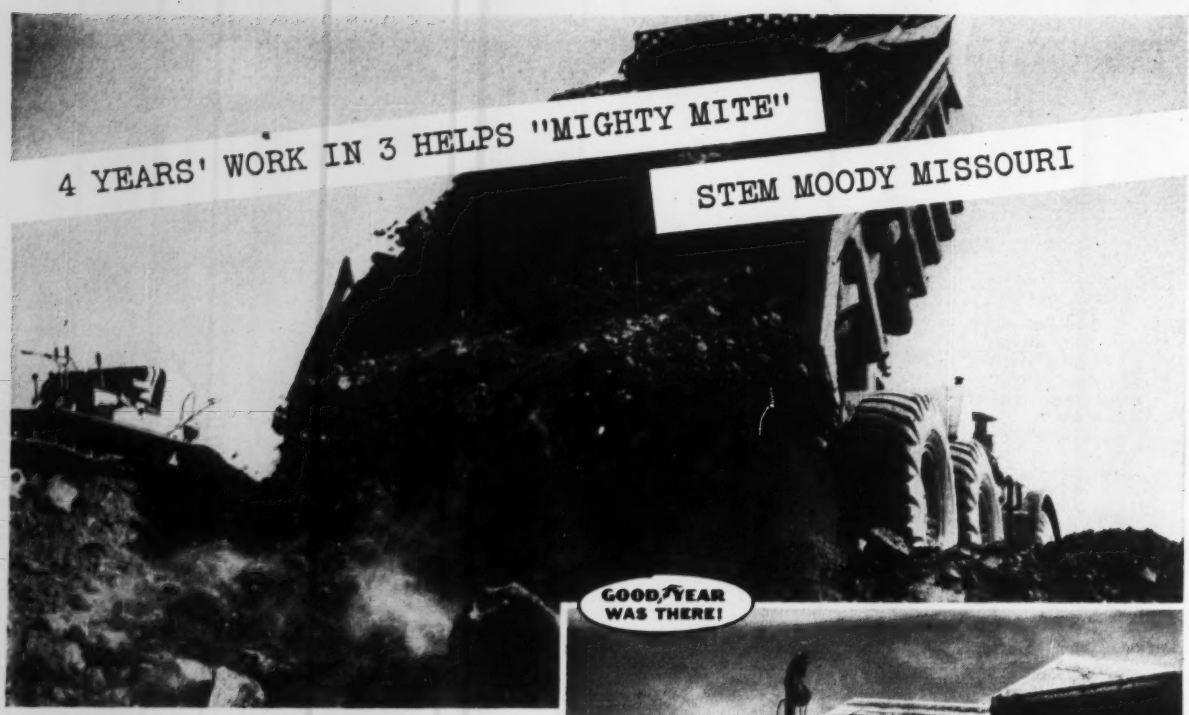
BEATING THE STEEL SHORTAGE—The Illinois state Toll Highway Commission will take bids next week on a test bridge of prestressed, precast reinforced concrete. If adopted, this design will have application at 200 or more bridge locations. It is reported to offer a potential saving of $4 million to $5 million. Work on 193-mi, $415-million toll road program is expected to get under way July 1.

PRELIMINARY BOUT ON THE COLUMBIA—An intramural attempt to settle a bitter dispute in Canada over Columbia River dams and diversions will be made this spring in Victoria, B. C. Representatives of the federal government in Ottawa will meet with British Columbia in search of some agreement prior to proposed international talks.

TURNPIKE RESURFACING—With another 40 mi of resurfacing scheduled, the Pennsylvania Turnpike Commission by year's end will have completed repaving 100 mi of the original 160-mi stretch of the nation's first modern toll road. This part of the turnpike was opened October 1940, new surfacing is blacktop, without reinforcing.

CANADA FAVORS WATER DISCUSSION—The idea of an international parley on boundary water problems—including also Passamaquoddy, the Stikine River in the Yukon and the St. John River in New Brunswick—was considered by Canada the most important item of discussion at the recent get-together of President Eisenhower, the Canadian Prime Minister and Mexico's President.

But before any such conclave, dominion and provincial interests in Canada have to agree on two important projects: Kaiser Aluminum's proposed $25-million storage dam at Castlegar and the $250-million Mica Creek project located on the big bend of the Columbia.



THE GAVINS POINT DAM is a "mite" compared with its giant fellow dams of the vast Missouri Basin Development Program. But Gavins' 8,700-foot crest length and 800-foot base-width make it a MIGHTY mite. After a flooded-out start, 2 million yards were moved in a record comeback and classic 8-day closure, spearheaded by end-dumps as shown above. The tires are Hard Rock Lugs by Goodyear.

LATEST IN TIRE-MAINTENANCE TRUCKS helps keep big fleet of earth-movers rolling.

Mighty fine cost-cutters on tough construction jobs—

3-T NYLON CORD Goodyear Job-Proved Tires

Look for this sign; there's a Goodyear dealer near you

In 2 years' rugged service on the toughest, fastest-stepping jobs, Goodyear's exclusive 3-T NYLON CORD has proved itself the greatest tire SAVER in 21 years! It keeps bruise-breaks and heat blowouts close to the vanishing point, virtually eliminates ply separation and flex failure—keeps tires in shape for many more re-lugs and recaps. If you want the most durable cord, plus the best in tire design, plus the toughest rubber compounds, specify Goodyear 3-T NYLON CORD Tires for every wheel on every job! Goodyear, Truck Tire Dept., Akron 16, Ohio

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE BUILT WITH 3-T NYLON CORD

Buy and Specify

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Road Lug, All-Weather, Sure-Grip—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

WASHINGTON OBSERVER

New legislation on welfare and pension funds may be stalled for this session in a dispute over what the law should provide.

Full disclosure of all funds including a breakdown of management fund handling and investments is the object of one group being led by Senator Douglas of Illinois.

Employers are resisting such disclosures. They say this in management's business as long as management is supplying the benefits.

Douglas' bill is stiffer than the Administration proposals which would leave disclosures up to the Secretary of Labor.

Congress is anxious to act because of the scope of the funds—75 million persons are covered; annual contributions total $6.8-billion; and reserves now amount to around $20-$25-billion.

If any law is passed, it is likely to be the milder proposals, but the disagreements may prevent any legislation at all. This week's report by the Douglas group puts pressure on CIO-AFL for a clean-up; it restates evidence of welfare fund frauds, including those of several building trades unions. Douglas says the union's ethical practices committee must act and act quickly.

•

Tighter money may hamper housing. Several developments indicate trouble ahead:

Higher interest rates for money follows the Federal Reserve Board's increase in the discount rate. In general, this means a trend toward higher interest rates on mortgages. Where the interest rate is fixed—as in FHA and VA-guaranteed loans—this means a larger discount to be absorbed by the builder, or mortgage broker, at least in theory.

This discounting process may help to stimulate Congress to act on proposals to tap veterans' life insurance reserves for the purchase of VA-guaranteed mortgages at par. There is considerable sentiment in favor of this.

•

Another spur to action on housing is VA's move to cut off requests for appraisals from builders after December 31. This would apply to builders who want VA's certificate of reasonable value before they start building, in order to be sure that the VA will approve the house for a loan if a veteran buyer is found for it.

This brings the VA deadline situation much closer. The actual cut-off date for approval of VA loans on completed houses is July 25, 1957. This means, in effect, that few houses can be started for sale to veterans beyond early March, 1957.

The new January 1 deadline on applications—if approved—brings the pre-deadline rush much nearer than most industry experts had figured. However, Rep. Rains (D-Ala.) has introduced a bill that would cut down the VA program gradually with final termination in four years.

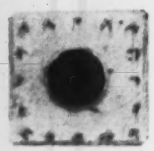
Appraisal requests to VA have not shown the bounce expected along about now. March figures reported last week look bad. In actual numbers, builders requests for appraisals rose less than 400 over February's 37,134. A year ago, February showed 64,192, and March showed an increase of 7,750. Last year, the total for the three months was 182,335 applications; this year the total is only 103,929 for the same period.

•

Public works policy is the issue in another election as REA Administrator Nelson runs for the governorship of Minnesota. Like Secretary of Interior Douglas McKay, Nelson will run on his record as a top Administration official. Nelson has been attacked for his policies of tightening up the requirements for co-ops after loans to build electric power and telephone facilities.

Prestressed Hollow-Core 'Incor' Piles

Speed Wharf Construction at Esso Standard Deep Water Oil Terminal



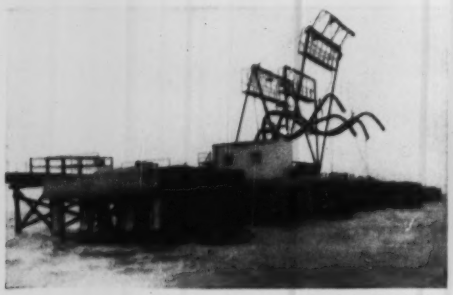
● Interesting feature of this wharf, recently completed at Esso Standard Oil Company's Deep Water Oil Terminal, Newport News, Va., is the use of precast prestressed hollow-core concrete piles in the tanker dock with its six reinforced concrete mooring and breasting dolphins.

Piles average 77 ft. in length, with 18 x 18 in. cross section and 8 in. hollow core. A total of 151 prestressed piles were precast and pretensioned at job site, three piles at a time in each of seven 250 x 30 ft. pretensioning benches, using 'Incor'* 24-Hour Cement in the mix for faster re-use of the casting beds.

In the pretensioning bench, 'Incor' substantially reduces production time, and therefore cost, by providing dependable high early strength in 24-48 hours, making possible faster turnover.

In service, 'Incor' high-early and high-ultimate strengths assure quality concrete which is specially important in realizing the fullest advantage from prestressing.

*Reg. U. S. Pat. Off.



Above, left, new wharf is supported on 151 prestressed 'Incor' concrete piles, average length 77 ft. Piles were prestressed at job site; right, placing 'Incor' concrete in forms.

ESSO STANDARD OIL COMPANY—
DEEP WATER OIL TERMINAL
Newport News, Va.

Designed by
CARIBBEAN CONSTRUCTION CO., LTD.
Kingston, Jamaica, B.W.I.

Engineers and General Contractor:
TIDEWATER CONSTRUCTION CORPORATION
Norfolk, Va.

Ready-mix 'Incor' Concrete:
BENSON-PHILLIPS COMPANY, INC.
Newport News, Va.

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THE ENTIRE CONSTRUCTION FIELD

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS. 18 MODERN MILLS. 38,000,000 BARRELS ANNUAL CAPACITY

1956 state highway programs

- They'll be plagued by slow steel deliveries and
- Handicapped by the engineer shortage, but . . .

Free Road Expenditures Will Be Up 21%

The shortage of structural steel and engineer manpower will make it tough going but state highway departments this year are working on roadbuilding programs that will total around $2.5 billion for a new record.

According to an ENR survey (see table on next page), 46 states and the District of Columbia have budgeted $2.4 billion for roadbuilding contracts for a 21% gain over 1955. They've earmarked 5% more in maintenance funds for a total of $633 million, and their equipment purchases will amount to $42.5 million or 18% more than last year. (These figures do not include toll road programs, which will be covered separately in next week's issue.)

Twenty-three highway departments, including key roadbuilding states such as New York, Ohio, Illinois and Michigan, expect delays in completing projects.

- 31 departments rate their outlook for steel deliveries as serious. New York, for example, expects delays of 12 to 18 months; Connecticut up to 14 months.
- 33 states report that they will be handicapped by lack of experienced engineers. Another 26 states complain of a shortage of trainees.

There's relatively little concern over the supply outlook for cement, reinforcing bars, lumber and equipment.

- **Solutions**—The continued difficulty of attracting engineers to state service has resulted in still more work going to consulting engineering firms. Actually 31 states report using consultants, and many of them to a greater extent this year. Massachusetts, for example, is making maximum use of consultants and spreading its own engineers thinner. It also, complains that consulting firms are luring many of its men away.

There are, however, indications that more serious attention is being given to use of sub-professional personnel as a means of freeing engineers for supervisory duties, notably in Michigan and California.

California incidentally, seems confident that it can cope with its big road program not only by revamping personnel policies but also by increased use of photogrammetry and electronic devices for earthwork and traverse calculations.

To mitigate the effect of the structural steel shortage, a number of state highway departments are now engaged in designing concrete bridges.

Actually the Pennsylvania Highway Department has been drafting plans for use of prestressed concrete instead of steel wherever possible ever since the steel shortage became acute. It reports highly favorable performance records on its concrete structures and indicates that their use may be continued even after the steel supply improves.

- **New contracts**—Ohio will set the pace this year in free road construction. The Buckeye state is scheduled to let contracts totaling $200 million for a gain of 8% over the 1955 contract awards of $185 million.

Other big programs this year include: California, $177 million; Texas, $174 million; Michigan, $127 million; Pennsylvania, $111 million; and New York, $100 million.

Three smaller states have stepped up their roadbuilding significantly this year. Connecticut will spend $40 million compared to $9 million last year. Maryland's expenditures will be up from $25 million to $78 million and Delaware's from $4.4 million to $12.5 million.

This year also will see some cutbacks. Louisiana, for example, will let $52 million in contracts as compared to $90 million in 1955. Kentucky's $339 million budget is $10 million less than last year; Oregon's $25 million is $5 million below.

Regionally, the biggest volume of roadbuilding again this year will be concentrated in the West of the Mississippi area, where contracts will total $628 million for a gain of 19% over '55. The Midwest will supplant the Middle Atlantic in second place, with expenditures of $540 million for a sharp rise of 28%. The South continues in third place with roadbuilding budgets totaling $497 million, 15% over last year.

- **Maintenance**—Funds for force account maintenance work have not been increased commensurate with amounts budgeted for roadbuilding. The $570 million earmarked by the 46 states and District of Columbia embraced by this year's ENR survey is only 4% greater than last-year's figure of $545 million. Pennsylvania this year leads all other states with a $67 million fund, followed by Texas with $36 million and North Carolina with $32 million.

Contract maintenance work amounting to $64 million is budgeted for this year as compared to $57 million in 1955. Michigan still favors this method more than any other state,

Status of the Highway Bill

The federal aid highway bill is expected to reach the floor of the House this week and debate should be underway next week. Meanwhile, the House Public Works Committee had disposed of two controversial issues by voting:

- **To include Davis-Bacon provisions requiring establishment of prevailing wages by the Secretary of Labor for all construction projects on the interstate system.**
- **To leave out provisions for reimbursing states for toll roads that meet interstate systems standards, at least pending completion of a study to be undertaken by the Bureau of Public Roads.**

STATE HIGHWAY PROGRAMS 1955–'56—EXCLUDING TOLL ROAD PROJECTS

Reported by State Highway Departments to Engineering News-Record, in thousands of dollars

	CONTRACTS			MAINTENANCE						TOTAL CONSTRUCTION AND MAINTENANCE			EQUIPMENT PURCHASES		
				By Own Forces			By Contract								
STATES AND REGIONS	Let 1955	Scheduled 1956	Percent Change	1955	1956	Percent Change	1955	1956	Percent Change	1955	1956	Percent Change	1955	1956	Percent Change
Maine	$12,000	$14,000	+8	$7,600	$6,900	−9	.....	.....	.....	$20,600	$20,900	+1	$300	$700	+133
New Hampshire	7,400	7,800	+5	5,591	4,907	−12	500	500	0	13,491	13,207	−2	306	306	0
Vermont	5,543	6,000	+8	3,970	4,150	+5	301	150	−50	9,814	10,300	+5	162	145	−10
Massachusetts	80,000	80,000a	0	13,000	13,000	0	2,000	2,000	0	95,000	95,000a	0	875	1,000	+14
Rhode Island	15,000	8,000	−47	2,730	3,000	+10	.....	.....	.....	17,730	11,000	−38	246	110	−55
Connecticut	9,000	40,000	+344	10,300	10,500	+2	300	300	0	19,600	50,800	+159	270b	780b	+189
NEW ENGLAND	**129,593**	**155,800**	**+20**	**43,191**	**42,457**	**−2**	**3,101**	**2,950**	**−5**	**176,235**	**201,207**	**+14**	**2,159**	**3,041**	**+41**
New York	76,000	100,000	+32	29,400c	33,600c	+14	.....	.....	.....	105,400	133,600	+27	2,000	2,000	0
New Jersey	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	700	750	+7
Pennsylvania	107,000	111,000	+4	58,000d	67,000d	+16	.....	.....	.....	165,000	178,000	+8	2,500	4,400	+76
Maryland	25,000	78,000	+212	6,100	6,200	+2	.....	.....	.....	31,100	84,200	+171	335	639	+91
District of Columbia	5,900	6,000	+2	2,000	2,000	0	680	700	+3	8,580	8,700	+1	183	163	−11
Delaware	4,400	12,500	+184	2,400	2,650	+10	184	250	+36	6,984	15,400	+121	84	130	+55
MIDDLE ATLANTIC	**218,300**	**307,500**	**+41**	**97,900**	**111,450**	**+14**	**864**	**950**	**+10**	**317,064**	**419,900**	**+32**	**5,802**	**8,082**	**+39**
Virginia	18,640	30,000	+61	20,000	20,000	0	5,000	6,000	+20	43,640	56,000	+28	942	500	−47
West Virginia	13,000	25,000	+92	13,000	19,000	+46	3,000	4,000	+33	29,000	48,000	+66	360	1,000	+272
North Carolina	39,000	40,000	+3	32,000	32,000	0	.....	.....	.....	71,000	72,000	+1	2,000	2,500	+25
South Carolina	24,000	30,000	+25	10,000e	12,000	+20	.....	.....	.....	34,000	42,000	+24	2,500	2,500	0
Georgia	50,000	70,000	+40	14,000	9,000	−36	.....	.....	.....	64,000	79,000	+23	1,000	1,000	0
Florida	60,000	87,500	+46	11,000f	12,000f	+9	.....	.....	.....	71,000	99,500	+40	50	50	0
Alabama	40,000	67,500g	+69	9,000	10,000	+11	.....h	.....h	.....	49,000	77,500	+58	1,900	3,500	+84
Mississippi	18,800	26,000	+38	5,200	5,300	+2	.....	.....	.....	24,000	31,300	+30	.....	.....	.....
Louisiana	90,300	52,000	−42	14,000	14,000	0	2,000	2,000	0	106,300	68,000	−36	1,200	900	−25
Kentucky	49,133	39,000	−11	15,039	15,500	+3	3,215	3,000	−7	67,387	57,500	−15	1,500	.....	.....
Tennessee	29,000	30,000	+3	7,200	8,500	+18	.....	.....	.....	36,200	38,500	+6	.....	.....	.....
SOUTH	**431,873**	**497,500**	**+15**	**150,439**	**157,300**	**+5**	**13,215**	**15,000**	**+14**	**595,527**	**669,300**	**+12**	**11,361**	**11,950**	**+5**
Ohio	185,000	200,000	+8	22,000	21,500	−2	7,500	8,000	+7	214,500	229,500	+7	1,000	1,000	0
Indiana	21,200	33,000	+56	13,300	13,400	+1	600	750	+25	35,100	47,150	+34	2,600	2,800	+8
Illinois	80,473i	94,000i	+17	17,680	18,000	+2	2,920	3,500	+20	101,073	115,500	+14	1,334	1,325	−1
Wisconsin	60,350	86,000	+43	6,549j	6,600j	+1	525	559	+6	67,424	93,159	+38	0k	0k	.....
Michigan	73,500l	127,000l	+73	4,900	4,000	−18	14,000	14,000	0	92,400	145,000	+57	257m	530m	+106
MIDDLE WEST	**420,523**	**540,000**	**+28**	**64,429**	**63,500**	**−1**	**25,545**	**26,809**	**+5**	**510,497**	**630,309**	**+23**	**5,191**	**5,655**	**+9**
Minnesota	39,000	50,000	+25	12,155	12,360	+2	3,573	4,170	+17	55,628	66,530	+20	318	335	+5
Iowa	46,000n	60,000n	+30	10,000	10,000	0	.....	.....	.....	56,000	70,000	+25	.....	.....	.....
Missouri	60,000	75,000	+25	18,000	20,000	+11	.....	.....	.....	78,000	95,000	+22	15	40	+166
Arkansas	23,426	29,000	+24	10,182	10,500	+3	.....	.....	.....	33,608	39,500	+18	969	1,371	+41
North Dakota	15,000	15,000	0	3,459	3,625	+5	264	1,000	+279	18,723	19,625	+5	220	210	−5
South Dakota	21,073	26,000	+20	5,508o	5,000	−9	1,629o	200	−88	28,210	31,200	+11	543	500	−8
Nebraska	21,059	22,500	+7	7,000	7,000	0	1,000	1,000	0	29,069	30,500	+5	660	650	−2
Kansas	41,000	41,000	0	9,100	9,761	+7	2,407	2,800	+16	52,507	53,561	+2	35	34	−3
Oklahoma	32,000	48,000	+50	10,000	10,000	0	.....	.....	.....	42,000	58,000	+38	500	1,000	+100
Texas	161,000	174,300	+8	34,500	36,000	+4	.....	.....	.....	195,500	210,300	+8	3,200	3,500	+9
Montana	19,000	23,000	+21	6,600	6,500	−2	600	700	+17	26,200	30,200	+15	530	500	−6
Wyoming	10,450	12,000	+15	3,110	3,150	+1	95	50	−47	13,655	15,200	+11	+0	0	.....
Colorado	21,900bp	34,500bp	+58	6,375h	6,845h	+7	.....	.....	.....	28,275h	41,345h	+46	948h	837h	−12
New Mexico	14,200	18,000	+27	5,000	5,500	+10	500	500	0	19,700	24,000	+22	203	200	−3
WEST OF MISSISSIPPI	**526,018**	**628,300**	**+19**	**140,989**	**148,241**	**+4**	**10,068**	**10,420**	**+3**	**697,075**	**784,461**	**+13**	**8,141**	**9,177**	**+13**
Idaho	11,411	18,805	+65	.....	.....	.....	.....	2,500	.....	11,411	21,305	+87	400	500	+25
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	16,672	18,000	+8	3,686	3,750	+2	618q	750q	+21	20,976	22,500	+7	350	400	+14
Nevada	9,000	15,000	+67	2,700	3,000	+11	.....	.....	.....	11,700	18,000	+54	306	400	+31
Washington	31,000	45,000	+45	10,000	10,000	0	1,000	1,000	0	42,000	56,000	+33	100	100	0
Oregon	30,000	25,000	−17	9,640	10,480	+9	1,200	1,460	+22	40,840	36,940	−10	731	824	+13
California	175,000	176,996	+1	22,155	21,000	−5	1,196	2,000	+67	198,351	199,996	+1	1,544	2,374	+54
FAR WEST	**273,083**	**298,801**	**+9**	**48,181**	**48,230**	**+0.1**	**4,014**	**2,710**	**+92**	**325,278**	**354,741**	**+9**	**3,431**	**4,598**	**+34**
UNITED STATES	**$1,999,740**	**$2,427,401**	**+21**	**$545,129**	**$569,178**	**+4**	**$56,807**	**$63,839**	**+12**	**$2,601,676**	**$3,060,418**	**+18**	**$36,085**	**$42,503**	**+18**

a Depends on legislative approval of $200 million bond issue.
b Fiscal year.
c Includes contracts with counties for snow removal.
d Includes $32 million for Department force construction projects in '56; $23 million in '55.
e 1955 included $7.9 million for ordinary and extraordinary maintenance; $2.6 million for pavement retreatment, and $91,000 for shoulder treatment. Most of retreatment done under contract; shoulders treated by Department forces.
f Not detailed by own forces and by contract; assumed to be mostly by own forces.
g Highway construction increased by $50 million bond issue.
h Small amount.
i Includes $82 million primary and $12 million secondary roads in '56; $64.4 million primary and $16.1 million secondary in '55.
j Excludes state purchased materials.
k State uses county forces and equipment for the day labor construction and maintenance.
l Includes $7 million county secondary roads in '56; $6.6 million in '55.
m Michigan has contracts with 68 out of 83 counties and 152 municipalities to perform maintenance on state trunklines.
n Covers primary roads only; excludes farm-to-market roads.
o Costs in '55 included $2.2 million of retread work.
p Excludes engineering costs and right-of-way expenditures.
q Seal coats.

budgeting $14 million in maintenance contracts in 1955 and 1956 compared to lettings of $10 million in 1953 and 1954. State highway budgets of both the Middle Atlantic and New England states provide only half as much for maintenance contracts in 1955 and 1956 as in 1953 and 1954.

• **Equipment**—At least 14 states will be a million dollars or over market for roadbuilding equipment this year. Pennsylvania will provide a $4.4 million market. Other big purchasers will be Alabama and Texas, $3.2 million; Indiana, $2.8 million; North and South Carolina, $2.5 million each; California, $2.4 million; New York, $2 million.

Engineers Choose the Site For San Diego Bay Crossing

An engineering report on the proposed crossing of San Diego Bay by vehicular tube or bridge has selected the "most favorable" site to link San Diego with Coronado.

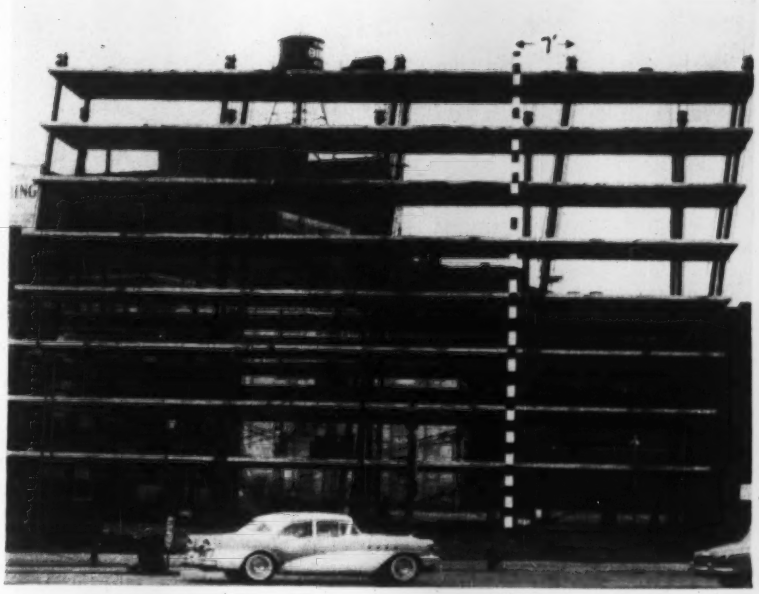
The site—connecting the foot of 11th Ave. in San Diego with Fifth St. and Prospect Place and Coronado—was chosen after borings were taken along 11 possible underwater tube routes and five proposed bridge routes. All were found feasible, according to William McIntyre, bridge engineer for the California Division of Highways.

Results of the engineering study will be sent officially to the California Toll Bridge Authority this fall. The economic feasibility report, not yet completed, is being made by Coverdale & Colpitts of New York.

Philadelphia Will Continue Study of Turnpike Linkage

The Philadelphia City Council has approved further study of three proposed routes for the $180-million Delaware Expressway. The highway will connect with the New Jersey and Pennsylvania Turnpikes.

The council's action launches the second phase of $435,000 route survey begun by the engineering firm of Edwards, Kelcey and Beck.



With eight slabs held only by wedges . . .

Wind Tilts Lift-Slab Garage

Wind acting against uncompleted column connections appears to be responsible for the shift of an eight-story Cleveland parking garage more than 6 deg out of plumb.

The building was being constructed by the lift-slab method. Floor and roof slabs were concreted at ground level and raised into position by jacks atop steel columns and at the close of work on April 6, all eight slabs were in place—but held only by steel wedges. Then the winds came; varying from 10 mph to gusts of 35 to 50 mph between midnight and noon the next day. About midnight the structure shifted in the direction of its long dimension, the top coming to rest 6.7 ft out of plumb and the fifth floor within a few inches of an existing, lower building.

Being built for Park-A-Matic, Inc., Cleveland, at a cost of about $250,000, the building is to serve as a "pigeonhole" garage, with parking space for 216 cars. It consists of two eight-story, independent sections, each 91x21 ft in plan. Between them are to be installed two elevators that can move automobiles horizontally and vertically to vacant parking spaces.

• **Hollow columns**—The concrete floors in each section are supported on ten 61-ft high columns arranged in two rows. In each row, the columns are spaced about 22 ft c-c. All are hollow, square sections, made up of two welded steel angles, which are to be filled with concrete later.

Corner members are composed of 8x8x⅝-in. angles, interior verticles of 8x8x½-in. These box sections were reinforced internally with two 5x⅞-in. plates to a height of 11 ft above the ground floor. The plates were attached to the column faces parallel to the long dimension of the building which thereby resulted in giving the vertical members greater rigidity in the narrow direction.

• **90-ton lift**—Concrete slabs are 8 in. thick, weigh 180,000 lb apiece. Floor-to-floor height is 9 ft in the first story, 7 ft 4 in. above.

The slabs were concreted at ground level by Industrial Cement Floors, Inc., Cleveland. For purposes of lifting and anchoring them to columns, cast steel collars were embedded in the slabs around the verticals. Lifting was carried out by Central Lift-Slab Co., also of Cleveland.

The first sections of columns erected were 30 ft high. Rods were extended from hydraulic jacks atop them to the lifting collars in the slabs. Roof and floors for the upper stories were lifted first and supported temporarily at fourth-floor level until the lower-floors were placed. Then the columns were extended to their full height, the jacks shifted to the top and the upper slabs raised. At each column, the slabs were supported temporarily by steel wedges on the underside only.

Generally, steel shear plates are welded to the collars and columns to anchor the slabs in place as soon as they are positioned. This time, the erector planned to weld all connections at one time.

• **Erection mistake blamed**—William D. Guion, Cleveland Building Commissioner, after inspecting the tilted structure, expressed the opinion that this was the mistake:

"They didn't weld as they went along," he said. "If they had welded at each floor as they put it up, the building would have been braced and this would not have happened."

As soon as the tilt was reported, the area around the structure was roped off. Guys were attached to the framing early April 7 but were not taken up tight. At 10 a.m. the structure was still standing in the deformed position without the benefit of tightened guys; yet no structural damage was reported, except for cracks up to 2 ft long in three slabs, apparently caused by the locking moment of the columns in the collars.

• **Not overstressed**—R. M. Gensert, of R. M. Gensert & Associates, Cleveland, the structural designer, issued the following statement:

"It has been determined that the building is about 6.5 deg out of plumb, instead of the 20 deg heretofore reported. . . . Computed stresses of the steel columns due to the measured position of the structure are under the plastic range of stresses for structural steel. By this I mean that the structure will not continue to deflect under its present load. If the column stresses were in the plastic range, then the structure would have failed within the time interval which has already elapsed."

John P. H. Perry, Director Of Turner Construction, Dies

John P. H. Perry, 73, who retired in 1950 as vice president and director of Turner Construction Co. with which he was associated for 44 years, died in New York City April 14.

In 1952 he was appointed deputy for installations to the Assistant Secretary of the Air Force and spent two years expediting air base construction in the U. S. and overseas. He became president of Lift Slab Corp. of New York after serving the government and later carried on consulting work in New York.

A native of Texas and a Harvard graduate, Mr. Perry had been director of the American Society of Civil Engineers 1933-35 and president of the society's Metropolitan Section. He also had served as president of the United Engineering Trustees and the Engineers' Council for Professional Development.

What Failures?

Asphalt Institute hits AF pavement failure charge

No asphalt pavement failures were found by Asphalt Institute engineers who investigated seven airbases cited by the Air Force in support of its recent directive barring future use of bituminous pavement for runways and primary taxiways.

In a final report completed by the institute last week, the engineers said that their field investigations had revealed serious pavement distortions at only two of the seven bases—and in both of those places the pavement distress was attributed to foundation failures.

Complaints about unsatisfactory asphalt pavement by airbase commanders over the last several years had caused the Air Force to reclassify primary taxiways and the full length of runways as critical operational areas requiring portland cement concrete pavement (ENR Feb. 23, p. 21). The seven airbases investigated by the Asphalt Institute were among the most flagrant examples submitted by the Air Force to the Defense Department in justification of the change. The Defense Department approved the new criteria Dec. 20.

Institute engineers found asphalt pavement distress at two of the seven fields. They blame the pavement distortion on foundation failure at both of these airbases. Pavement settlement at Pine Castle AFB in Florida, they say, resulted from inadequate compaction of substructure materials in certain areas. Similarly, at Altus AFB in Oklahoma, pavement distortion was ascribed to foundation failure resulting from saturation of soil-aggregate base materials by water that could not drain off through a faulty drainage system.

No serious pavement distress was found by the institute investigators at the five other Air Force bases on the list: Tinker in Oklahoma, Castle and March in California, and Williams and Davis-Monthan in Arizona. In fact, at two of these bases, the investigating engineers were baffled by a statement of the commanding general that report of a complaint from his office must be in error because he never had expressed dissatisfaction with asphalt pavement.

The engineers had some recommendations to make. In addition to urging more careful compaction and greater attention to drainage, they suggested that future runways and taxiways, be designed with a thickened section in the longitudinal center strip of the pavement. Present design criteria, they say, assumes that aircraft movements will be distributed over the entire width of taxiways and runways. Heavy bomber traffic, however, tends to channelize along the centerline, they report.

This channelization and steadily rising wheel loads call for heavier pavement design to carry the concentrated loading, the report says.

Institute engineers also reported a serious lack of proper airfield maintenance at nearly all installations. These findings confirmed in every respect the report of a special committee of the Highway Research Board which studied pavement conditions on 27 major military fields last year at the request of the Defense Department. Inadequate maintenance was blamed by the institute investigators for much of the difficulty with both flexible and rigid pavement. In some places, they said, rigid pavement was in worse shape than flexible.

Asphalt Institute engineers will soon discuss the results of their investigation at a scheduled meeting with the Corps of Engineers, construction agent for the Air Force. Beyond that, the institute has no present plans.

Some oil company executives have been urging the House Armed Services Committee to investigate the change in Air Force pavement classification. Two years ago, this committee compelled the Air Force to give up a percentage differential favoring portland cement concrete in evaluating bids for pavement contracts. Since then, portland cement has done well on a strictly competitive basis.

Asphalt interests have no quarrel with the old designation of critical areas, specifying portland cement concrete for refueling, maintenance and warmup aprons and for runway ends. However, they want to be able to compete for taxiways and the central portions of runways.

Continental Divide

Colorado opens bids on controversial tunnel job

The Colorado State Highway Department opened bids last week on the long-discussed highway toll tunnel beneath the Continental Divide west of Denver.

One proposal by Colorado Tunnel Constructors, Inc.—a combine made up of Brown & Root, Inc., Houston, Tex., A. S. Horner Construction Co.; and Colorado Constructors, Inc., Denver—offered bids on both sites under consideration. On the Straight Creek site, near Loveland Pass and U. S. Highway 6, it offered $7,596,835. Its other bid was $16,465,440 for a tunnel on Berthoud Pass, which is U. S. 40, west of Denver. Both tunnels would have the same dimensions: 4 to 6 miles long and 28 ft 9 in. wide, with a 14-ft clearance.

Another bid was offered by a second joint venture, Northwood, Inc., San Francisco. It asked for another 30 days to prepare a more detailed proposal, but submitted a bid of $22 million for the Berthoud Pass site.

There has been a legislative limit of $16 million on proposals to build the tunnel (ENR March 22, p. 26). But Gov. Ed C. Johnson said he would call a special session in June to consider the problem, and the limit may be lifted.

Billion to End Slums

Report states N.Y.C. can clean up slums in 20 years

Slum-burdened New York City can eliminate its 400,000 substandard dwelling units within the next 15 to 20 years if it combines private redevelopment with an expanded public housing program, Chairman Robert Moses of the Mayor's Slum Clearance Committee predicted last week.

Reporting on the city's slum clearance and urban redevelopment program, Moses put a price tag of $1.18 billion on 35 projects, that would rebuild a number of the city's blighted areas. Private developers would invest a total of $898 million in the overall program; public agencies would account for the rest.

Ten projects now under contract will clear 162 slum acres and provide 13,784 apartments. Seven more projects in the planning stage call for renewal of 200 acres of blighted land to provide 13,230 dwelling units. The remaining 18 projects in the program have not yet reached the planning stage. They would clear 273 acres and call for construction of 24,000 new apartments.

All 35 projects are being developed under Title I of the National Housing Act, which permits the city to condemn the land and resell it to private builders at cut rates. Two-thirds of the loss sustained in acquiring the land is paid by the federal government. The other third is paid by the city.

One of the biggest private redevelopment projects in the overall program is the soon-to-be-started Lincoln Square project. Fifty acres of blight will be cleared to permit construction of a new music and art center, four new theaters, a new midtown campus for Fordham University, middle-income housing for 5,500 families and a large shopping center.

Bolting Is New, TV too—Both Meet

PNEUMATIC WRENCH takes up on high-strength bolts for New York skyscraper.

Television's wandering eye came to the building industry with a visit to the erection of a high-strength bolted skyscraper at 425 Park Ave., between 55th and 56th St., in midtown New York.

Beams were swung into place, connections were bolted up, men balanced on structural members—all of the forceful actions of the construction scene were brought into the serenity of the viewers living room.

Object of attention was erection of the 5,300-ton steel frame of a 375-ft high office building—one of the tallest to be built to date with bolted connections. Set by two-man crews, the high-strength bolts varied in size up to 1⅛ in. dia, 7-in. grip. The completed structure will have 150,000 field bolts and 200,000 shop rivets in its steel frame.

Exterior of the building will consist of vertical lines of 16-in. white brick piers spaced by dark-blue glass spandrels mounted in aluminum frames. Above and below the spandrels will be double-hung windows with heat absorbing glass, also set in aluminum frames.

Fabrication and erection of structural steel were by American Bridge Division, U. S. Steel Corp. George A. Fuller Co. is general contractor, Kahn & Jacobs, architects, and Charles Mayer, structural engineer—all of New York City.

TV CAMERAS enabled millions of home viewers to watch a relatively new fastening technique being applied to a tall building.

Delaware River Authority airs . . .

Big Plan for Rapid Transit

Latest rapid transit proposal is a planned $242-million system that would link Philadelphia with outlying southern New Jersey suburbs through a tube under the Delaware River.

Plans—recently aired by the Delaware River Port Authority—are based on a mass-transportation survey conducted by Parsons, Brinckerhoff, Hall and Macdonald, consulting engineers of New York City. The $345,000 study took 19 months to complete, according to the authority.

Though the study was originated to determine the feasibility of a high-speed rapid transit system covering a 35-mi radius east of the Delaware, the engineers recommended a first-stage project that would penetrate New Jersey only 10½ mi on the longest line. If extension proved necessary at a future time, the second stage could be started then.

The recommended system would involve three branches radiating eastward from a single trunk line between Philadelphia and Camden, N. J. The plan would provide grade separated routes—most of them depressed or elevated—generally along existing railroad rights-of-way but entirely separate from railroad trackage. The trunk line would connect an existing elevated railroad station in Camden, N. J., with the proposed Arch Street subway line through the proposed tunnel. Midtown stations along the Arch Street line would be closely and conveniently spaced, and the terminal station would be located in the heart of Philadelphia.

Most commuting from the New Jersey suburbs of Philadelphia is by automobile and bus, and the rapid transit system would eliminate much of the congestion caused by commuters and shoppers that storm the central portions of the city.

• **Financially feasible**—The $242-million cost of the system does not include an additional $56 million that would be necessary for financing during the five-year building period. One of the major conclusions of the study is that revenues from such a system would be adequate to defray operating expenses, interest and amortization of the capital cost of rolling stock, yards and shops. But, the firm concludes, debt service for the major portion of other capital costs, mainly the cost of construction of transit routes and stations, will have to be met out of other sources of income.

Smith, Barney and Co., New York investment banking firm, made a financial feasibility study; and their conclusion, incorporated with the engineers report, declares that if the system is to be financed and constructed by the authority, other sources beyond those now at its command would have to be tapped.

Smith, Barney advanced four financing possibilities:

- Bonds issued by the authority for the full cost of construction, backed by the credits of the two states.
- Bonds issued with a portion of the project backed by the authority, and the remainder backed by the states.
- Increased tolls for the Benjamin Franklin and Walt Whitman vehicular bridges, as well as the proposed Tacony-Palmyra bridge.
- Increased tolls for bridge facilities, together with contributions towards capital cost of the system from other sources.

• **Automatic controls**—According to the authority air-conditioned stainless steel trains, capable of 70 mph, would operate only 90 sec apart during morning and evening rush hours to cut travel time between Philadelphia, Camden and southern New Jersey towns by more than half.

All trains would be equipped with automatic controls that would govern their speeds and automatically berth and dispatch them at stations along the routes.

Passengers would wait no longer than 15 min for trains during off-peak hours, and fares would be lower than now charged by commuter systems either buses or trains.

The engineers recommended abandonment of present rail facilities on the Benjamin Franklin Bridge in order to add extra traffic lanes because, they said, while use of the rail facilities would save an initial $26 million in capital costs, it would eventually cost more than $40 million when abandonment of the bridge line is necessary. It also would add five minutes running time to schedules which would be possible with the under-river crossing.

Lumber Laundry Removes Flood Mud

The Pacific Lumber Co. has installed this device at its Scotia, Calif. mill to reclaim some 10,000,000 board feet of redwood lumber soiled by recent floods.

In the washer, the lumber passes over live rolls under 30 water jets spraying from four directions. First jets are high pressure—100 psi—and they taper off to 10 psi. Four rotating brushes scrub each surface of the lumber, which is subsequently air-dried then kiln dried. The company figures costs at $9 per thousand.

Measures such as this are described as one reason for a fair availability of lumber despite floods and heavy snow (ENR April 12, p. 21).

State legislature passes bill to establish a . . .

Central Water Agency for California

Out of the California legislature which adjourned April 5 came two major accomplishments—passage of a bill to create a State Water Resources Department and the appropriation of $9.4 million for the Feather River project.

In other major legislation the lawmakers cleared the decks for start of work on the $235-million southern crossing of San Francisco Bay.

The water department bill, which Gov. Goodwin J. Knight said he will sign into law, brings into one governmental agency many of the different branches of agencies involved with water matters.

This legislation assumed special importance because the state expects to take the role of a major construction agency for dams and related water projects, and hopes to do a more effective job through a central water resources department.

However, retaining their power will be the state and regional water pollution control boards, California Securities Commission which passes on water bond issues, Colorado River Commission, State Reclamation Board, California Kalmath River Commission and the California-Nevada Interstate Compact Commission.

The Division of Water Resources in the State Department of Public Works, the Office of the State Engineer and the California Water Project Authority are among the agencies abolished and integrated into the new department.

• **Director and advisors**—The present State Water Resources Board is changed to serve in an advisory capacity to an $18,000-a-year director of the department (yet to be named). The legislation directs the board and the director to be "in agreement whenever possible" but for the purpose of fixing responsibility to the governor and to the legislature, "in the event of disagreement between the director and the board . . . the views of the director shall prevail."

A State Water Rights Board of three members at a salary of $15,000 a year also is set up in the legislation. The governor would appoint the members and the requirement is written into the legislation that one will be a registered civil engineer.

The new department will become effective July 4, but Gov. Knight plans to select the director and other key officers before then to permit them to become acclimated to California water problems. Knight has not indicated whether he will select an engineer or an administrator for the top position.

All civil servants in agencies that are abolished are assured of positions in the new department.

• **Feather River money**—The major part of the appropriation for the Feather River project will go for surveys, explorations and preparation of construction plans and purchase of sites for the Oroville Dam and San Luis Dam, major units of the proposed $1.5-billion project. Funds also are provided for buying rights of way for the relocation of highway and rail facilities at the Oroville Dam site and for engineering and exploration work on aqeduct routes to areas where water service could be expected.

The action to expedite construction of the south bay crossing was in the form of amending the approaches system to reduce the ultimate cost of the project by $15 million and to pave the way for the issuance of revenue bonds to finance the work. Legislators sponsoring the legislation said it will be possible with a 25-cent per car toll on the bridge under the revised plan. Tolls on the present San Francisco-Oakland Bay Bridge also will be pledged to pay off the southern crossing bond issue.

In another action the lawmakers voted $24.9 million to help repair public facilities damaged by last winter's devastating floods. An estimated $20 million of this work will be for county roads and city streets.

The record $1,779-million budget approved by the legislature includes $237 million for highway construction and $90 million for state buildings.

The lawmakers put on the November election ballot a $500-million bond issue for continuation of the state's farm and home loan program for veterans. The legislature upped the maximum loan possible for homes under the program from $8,500 to $15,000 and the amount possible for farm loans to veterans was increased from a maximum of $15,000 to a maximum of $40,000.

Also approved was $150,000 for a "drop by drop" inventory of California water resources by the new state water department and $75,000 for a study of the use of sea water for agricultural purposes.

The legislature also passed a bill to appropriate $3.5 million to flood stricken cities for redevelopment of flood damaged areas.

Wide World photo

Upper Colorado Is Signed Into Action

With obvious satisfaction, President Eisenhower last Wednesday signed the bill authorizing the $760-million Upper Colorado River flood control and reclamation project, saying: "This bill represents what I believe in—treating a whole river valley as a unit. It goes from top to bottom. It recognizes one thing that is also true—that water is getting to be our most valuable resource."

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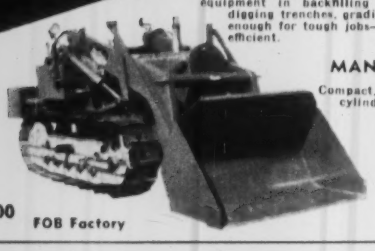
The Krawloader loader eliminates many of the costly headaches of big equipment in backfilling around culverts and buildings, clean-ups, digging trenches, grading, etc. 36 yard, struck capacity bucket. Large enough for tough jobs—compact enough for small jobs. Economical, efficient.



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Compact, low clearance unit. Four double-action V-pac cylinders with chromed rods. Powerful front mounted vane type hydraulic pump, auxiliary relief valve, oil filter and control valves. Bucket positioning indicator. Rugged box-section main frame. Ballast box beams, with attached fenders, removable to allow servicing of tractor final drive.

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Water Supply Unit

Commission is established to act on Ontario's needs

Legislation to establish an Ontario Water Resources Commission has passed. The three to five commissioners to be designated by the Lieutenant-Governor of the province will have the power:

- To develop and make available supplies of water.
- To construct and operate systems for the supply, purification and distribution of water and for the disposal of sewage.
- To enter into agreements with respect to the supply of water and the disposal of sewage.
- To conduct research programs and to prepare statistics for its purposes.

The new commission may borrow money and issue bonds or other securities which will have the guarantee of the Province of Ontario. It has all the powers of a municipal corporation. It may buy land, or expropriate it if necessary.

Any municipality may apply to the commission for a supply of water and contract with the commission for its delivery. Such a contract would entail annual payments to cover the cost of the service, including interest charges and administrative costs of the commission.

Passage of the Ontario Water Resources Act, 1956 came as result of current concern in Ontario over water supply problems, especially in the southwestern part.

Recent surveys of various health, agricultural and industrial interests have all pointed to the need for water resource development and the need for long-range planning toward that end. It was decided to attack the problem at the provincial level.

Mississippi Legislature Creates Road Plan Group

The Mississippi state legislature has created a seven-member highway planning committee to serve until the next regular session (January, 1958) to study the state's road needs and make recommendations for improving existing conditions and services. Members of the group have not been appointed as yet.

Under terms of the act creating the group, the committee will study all phases of the highway problem, including the sources of funds, costs of construction and maintenance and administration of a road program. A particular point to be studied will be an integrated farm-to-market road system for the state.

ANOTHER TEST— ANOTHER WIN FOR NEW CAT* LOWBOWL SCRAPERS!

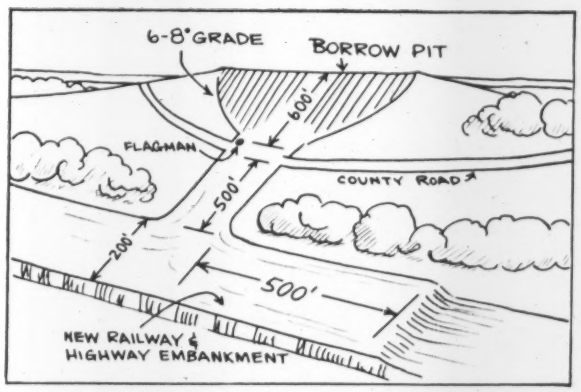
FIRST in loading tests on the Kansas Turnpike against six competing scrapers, including one noncurrent DW21-No. 21, which was runner-up!

FIRST AGAIN, against two DW21-No. 21s, in tests in Iowa!

Test after test in the field proves the ability of the new Cat DW21 (Series C)-No. 470 LOWBOWL Scraper to deliver bigger, faster loads than competing scrapers — including the unit it succeeded, the DW21-No. 21. Here's a recent test made in Iowa. Look it over—see how Caterpillar's exclusive LOWBOWL design pays off in bigger production on the job!

Complete details of this and other on-the-job tests are carried by your Caterpillar Dealer's salesmen. Ask him to show them to you.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



DESCRIPTION OF TEST

JOB AND LOCATION: Highway and railroad relocation near North Liberty, Iowa, involving 600,000 cu. yd. of fill. Contractor: The Stewart and Rank Construction Co., Bettendorf, Iowa.

CONDITIONS: ***Material*** — wet-damp gumbo and red glacial clay mixed with gravel. ***Loading conditions*** — borrow area with 6 to 8% favorable grade, Cat D8 Tractor used for pusher. ***Haul distance*** — 1600 feet. ***Return distance*** — 1600 feet. ***Grade*** — 600 feet of 6 to 8% favorable grade out of borrow area, remainder negligible. Return same route.

AVERAGE CYCLE TIME:	DW21-No. 470 LOWBOWL Scraper	DW21-No. 21s
LOAD	1.00 min.	1.02 min.
HAUL	1.40	1.65
DUMP	.69	.60
RETURN	2.51	2.88
Total no-delay cycle time	5.60	6.15
Wait and delay time (average of all units to facilitate comparison)	.70	.70
TOTAL CYCLE TIME	**6.30**	**6.85**

COMMENTS: Though the DW21-No. 470 LOWBOWL Scraper carried larger loads, the combination of its turbo-diesel horsepower, highly efficient power train and big, wide-section tires gave the unit a 14% advantage in cycle time.

In the dump area, its power, traction and flotation really paid off. Noncurrent models often had to be pushed while unloading — the new machine seldom required pushing.

RESULTS OF IOWA TEST

	DW21-No. 470 LOWBOWL Scraper	Noncurrent DW21-No. 21s without sideboards
Average load in bank cu. yd.	18.9	15.5
Total average cycle time on 3200-ft. round trip	6.30 min.	6.85 min.
Trips per hour	9.5	8.8
Production in cu. yd. per hour	180	133

LOWBOWL ADVANTAGE in bank cu. yd. per hour: 47

NEW CAT DW21 TRACTOR-NO. 470 LOWBOWL SCRAPER New Turbo-charged 6-cylinder Cat Engine packs 300 HP at 1800 RPM. Scraper capacity is 25 cu. yd. heaped, 18 cu. yd. struck. Exclusive LOWBOWL design loads more material faster because of less loading resistance. And new advance-design, wide-section tires are standard equipment. These tires give better flotation and traction in soft going.

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BIGGER, FASTER LOADS WITH CAT LOWBOWL SCRAPERS

Check these profit-making features!

NEW! THOR POWER TROWEL

Does a better, safer job with less crew time!

- Light weight . . . completely portable
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- Nationally serviced Briggs & Stratton 4-cycle engine
- Direct, vertical drive—no belts to wear, slip or replace
- Automatic clutch stops blades at idling speed
- Drive connection is at blade *center* . . . for best efficiency and balance
- 29" guard diameter permits access through standard doors, into basements, etc.
- ¾" tubular, one piece frame . . . extremely durable

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Post-Bellum TV Housed in Ante-Bellum Shell

Set on a hilltop outside Atlanta, Ga., a building just completed typifies the Old South from without with fluted wood pillars and red brick emphasizing its classic Georgian lines.

But within the traditional shell, all traces of the Ante-Bellum Era are gone. Instead, you find a bustling, modern TV and radio station with a maze of equipment.

The two-story structure is the new home of WSB, Atlanta, owned and operated by Atlanta Newspapers, Inc.

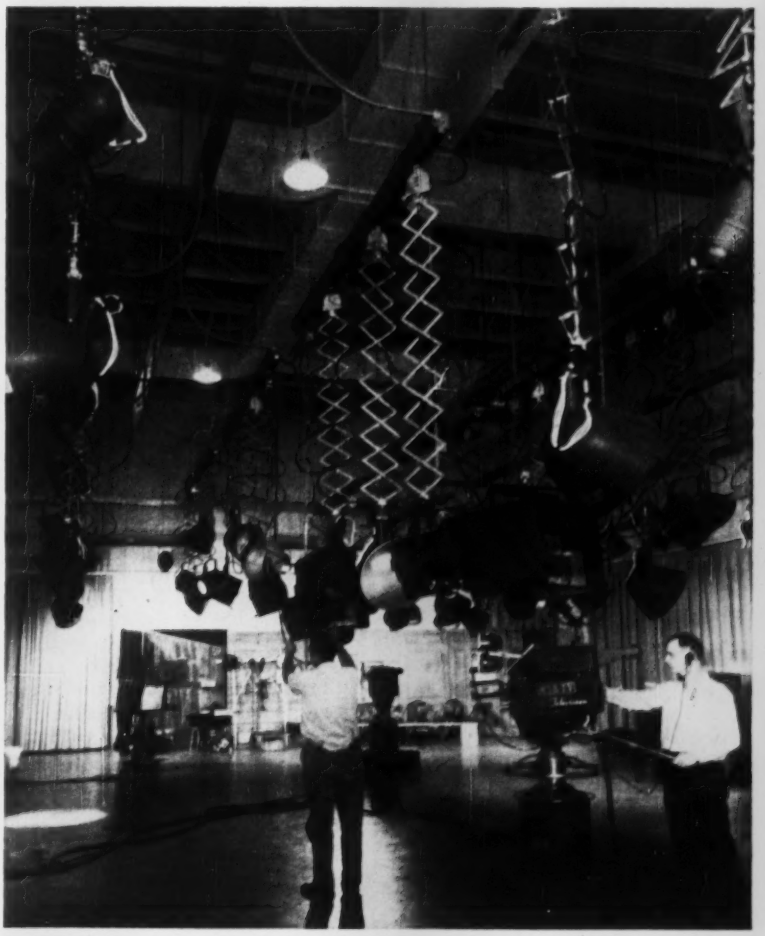
Two large TV studios on the ground floor—one 50 x 70 ft, the other 40 x 50 ft—are the key features in the building's layout. Clear span of the studios is made possible by the use of 50-ft open-web steel roof joists.

Joists are spaced 4 ft c-c to carry electric and air-conditioning ducts, in addition to TV lighting equipment. Bolted bars suspended from the joists carry square electric power ducts that run the length of the building. Chains attached to the joists carry horizontal supports for the TV spotlights. In the basement equipment room, expanded metal troughs suspended from the beams carry the cables from TV control rooms upstairs.

Cooling tower and fans for the air-conditioning system are located in and directly below a cupola atop the building.

At the rear of the building is an older studio and transmitter building that has been converted to an engineering department headquarters.

Design and construction of the building are by the Austin Company, Cleveland, Ohio.



TV SPOTLIGHTS are pantographed from horizontal supports chain-hung from joists

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Water Is Returned

Court reverses decision in Fallbrook water case

A three-year old court decision in the famous "Fallbrook case" over water rights in the vicinity of Camp Pendelton Marine Base in Southern California has been upset by the U. S. Court of Appeals in San Francisco.

It reversed a lower court judgment which gave "paramount" water rights on the Santa Margarita River in San Diego and Riverside Counties to the federal government (ENR Nov. 6, 1952, p. 19).

The appellate court ordered the case retired, principally on the basis that all landowners on the river watershed should have been included in the action, instead of only two—the State of California and the Santa Margarita Mutual Water Co.

The lower court opinion held that riparian rights of the government left no surplus water which could be appropriated. The appellate court challenged this point of view. It affirmed that the U. S. had sovereign rights to the water of the coastal stream as it flows for 21 mi through the Marine Base, but that rights of "upper riparians" had been prejudged before they were tried.

The hassle started soon after the Navy acquired the huge Santa Margarita Ranch and adjacent land in 1953. It sought to establish riparian rights on the river, claiming it had acquired prior water rights over local agencies, and started court action to prove it.

The district court then sought to confine the case to the three major defendants—the Fallbrook Public Utility District, the Santa Margarita Mutual Water District, and the State of California—which entered the case voluntarily. The Fallbrook PUD refused to be tried with the others, and its case never came to trial, although it was represented as a "friend of the court" in the appellate court.

However, in 1954 Congress passed a "compromise bill" calling for the government and the PUD to build a dam jointly on the Santa Margarita River. The project, which was never started, called for construction of De Luz Dam, at a cost of some $22 million. It would impound 186,000 acre-ft of water and yield 20,000 acre-ft per year, of which 60% would go to the Navy and 40% to the PUD. It would be located 9 mi. southwest of the town of Fallbrook.

George F. Yackey, general manager of the PUD, said the plan for a joint dam apparently was unworkable, and that the district is proceeding with plans for its own dam on the Santa Margarita, above the Marine reservation. This 160-ft high dam, one mile north of Fallbrook, would cost $3 million and impound 35,000 acre-ft of water.

Although he was unable to guess how the latest court decision would affect the PUD, Yackey thought it possible that the government might drop its suit, rather than proceed with an action which could consume several more years.

Nashville TV Tower Will Be Third Highest in the World

General Electric will start work shortly on a half-million-dollar TV tower for Station WSM, Nashville, Tenn. The new tower will climb to a near-record 1,379 ft to become the third highest in the world. TV towers already constructed in Oklahoma City (ENR Sept. 30, 1954, p. 31) and Dallas (ENR May 19, 1955, p. 17) are taller, rising to 1,420 ft and 1,390 ft respectively.

Use of a new steel alloy will lop 100 tons off the weight of the structure. Developed by U. S. Steel Corp., the alloy is about three times as strong and four times as corrosion-resistant as ordinary structural steel, according to John H. DeWitt, WSM president. Delivery will require several months.

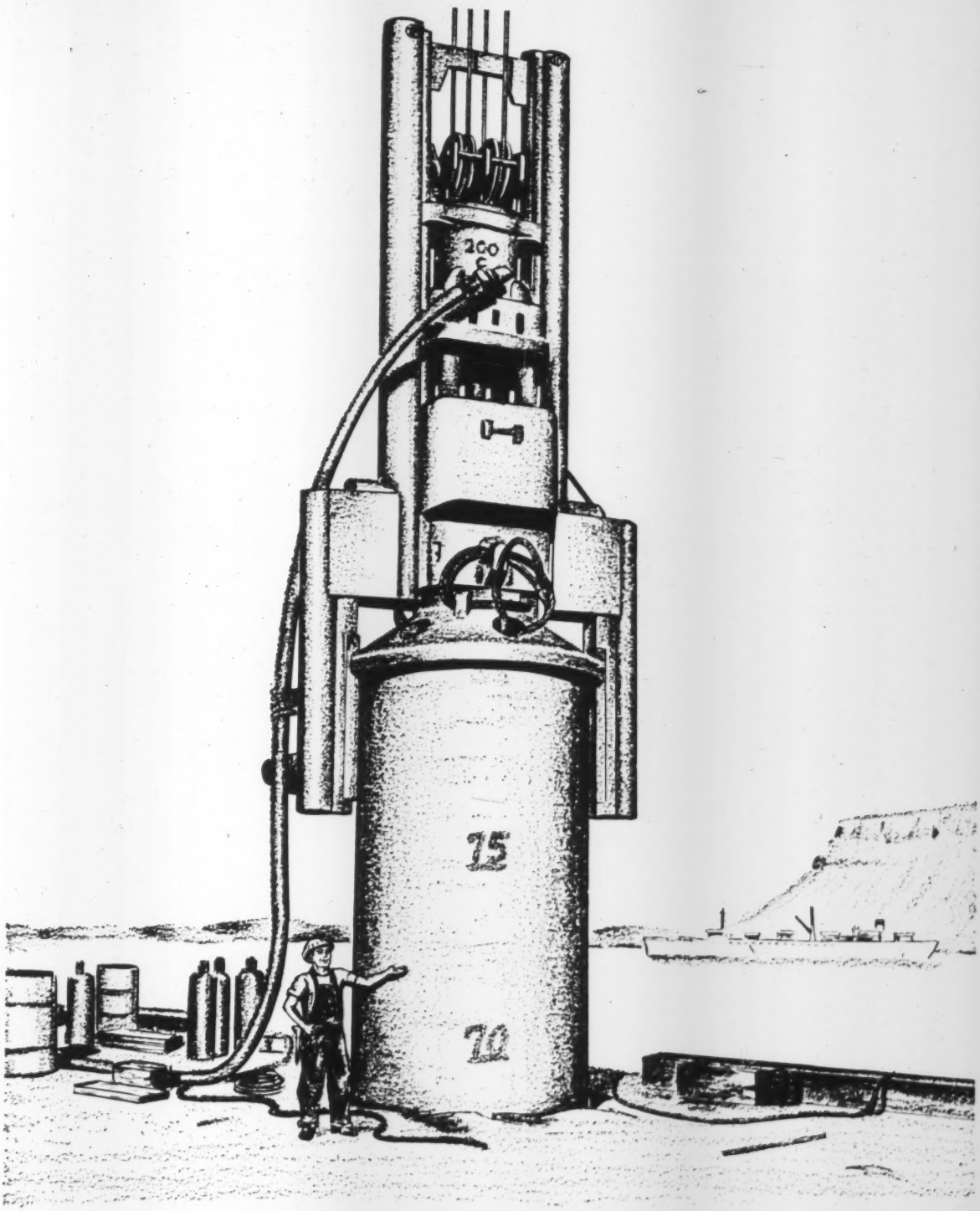
Besides contracting for the general construction, the General Electric Co. also developed the antenna, in conjunction with WSM and Dr. L. J. Chu, of Massachusetts Institute of Technology.

Hearings Unscheduled by FPC, Snake River Dams Are Delayed

Pacific Northwest Power Co., which hoped to begin building its two Snake River power projects in April, now has set back its schedule to September. The reason: the Federal Power Commission hasn't decided about hearings on the dams.

The four-company power combine plans to spend $213 million developing the Mountain Sheep and Pleasant Valley sites on the Snake, but heavy opposition has been encountered from conservationists, sportsmen's groups, the National Hell's Canyon Assn. and the farmer's unions of Oregon and Montana.

According to Kinsey M. Robinson, president of PNP, even if the FPC now schedules hearings by May 6, even the September start may not be feasible. With a September start, however, the two dams could generate their first power by late 1959 and be in full operation during 1960. The dams combined would produce 1,183,000 kw.



The Largest Pile Driving Hammer in the world, owned and operated by the DeLong Corp. The giant **200 C Super-Vulcan**, driving 6 Ft. Diam., 100 Ft. long caissons into place for support of the new and revolutionary DeLong Dock at Thule, Greenland.

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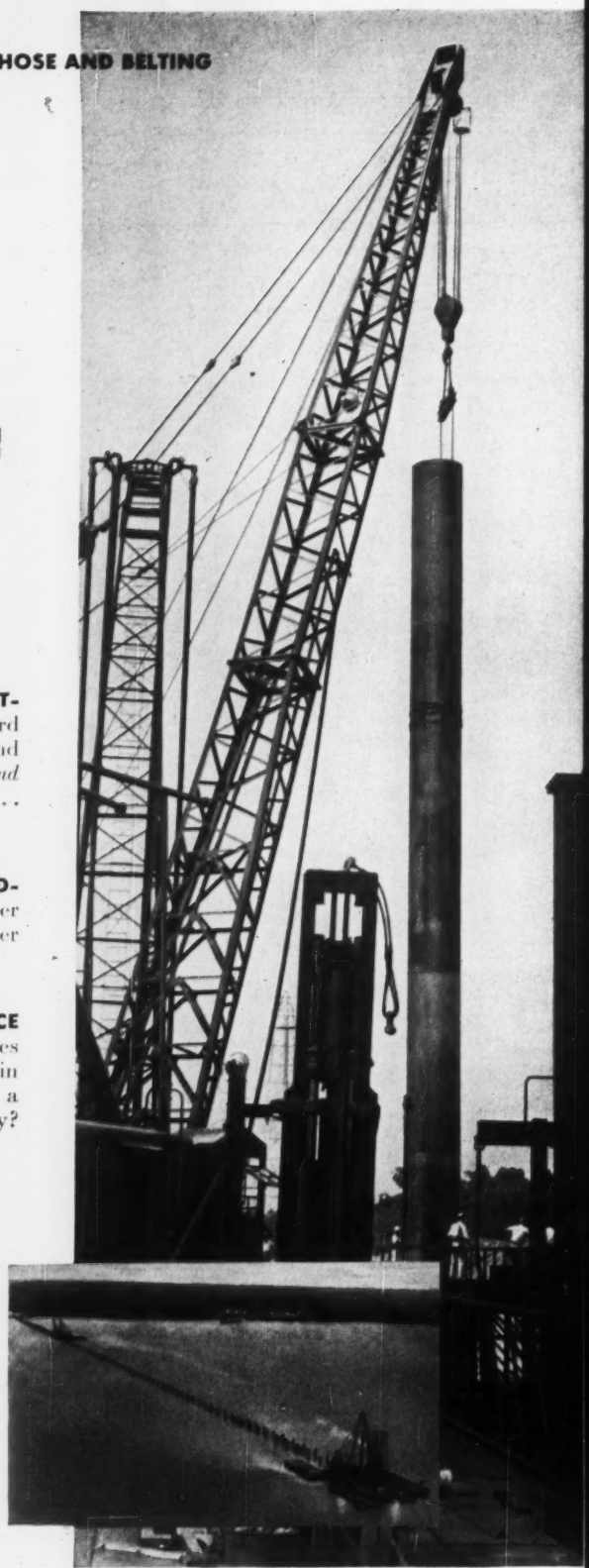

BREAKDOWNS ON ANY CONSTRUCTION JOB ARE COSTLY AND TIME CONSUMING. Contractors simply can't afford to take chances. That's why so many specify Boston hose and belting. They know Boston products have been used—*and proved reliable*—on the biggest, toughest construction jobs . . . jobs like the Lake Pontchartrain Causeway project.

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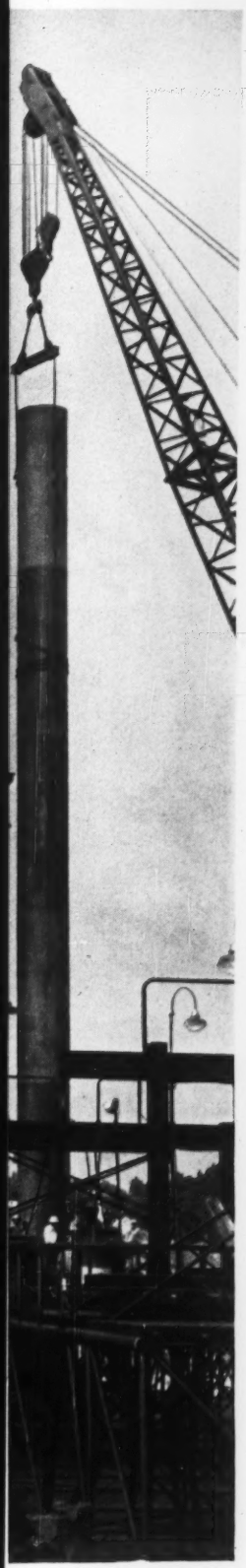
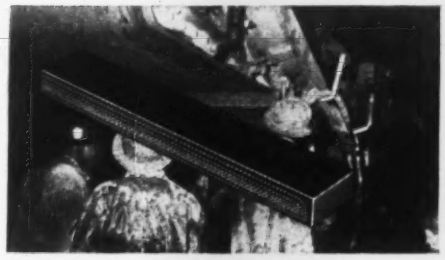
YOUR BOSTON DISTRIBUTOR GIVES YOU FAST SERVICE —immediate delivery when you need it, because he anticipates your needs, prepares to meet them. He's the Boston Man in your area, an expert in industrial rubber products with a thorough knowledge of construction. Why not call him today?

HERE'S PROOF OF BOSTON PERFORMANCE: On the $46 million Lake Pontchartrain Causeway project, Boston Jetting Hose and Pile Driver Steam Hose proved rugged and dependable by driving more than 4600 mammoth piles (each 96 feet long and 67,200 pounds) to help build the 24-mile span.

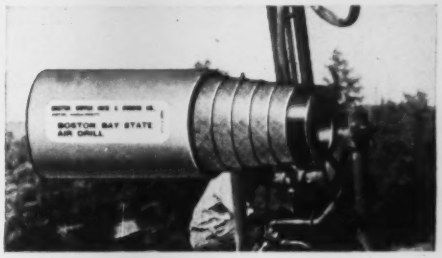
INDUSTRIAL HOSE • FIRE HOSE • BELTING



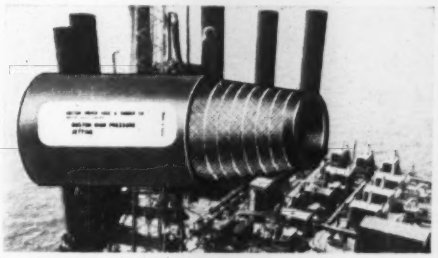
BOSTON CHECKLIST FOR YOUR HOSE AND BELTING REQUIREMENTS



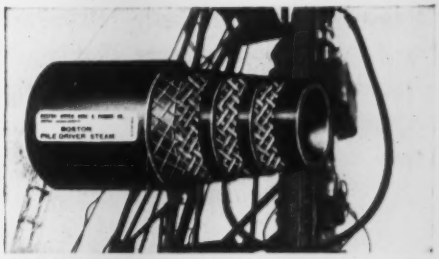
BOSTON MUCKER BELT: Reduce your maintenance costs as much as 34% with Boston Mucker Belt. It simply does not stretch—even after thousands of yards of solid rock. Contractors using Boston Mucker Belt often report replacing worn-out metal hinges seven and eight times *in the same holes!*



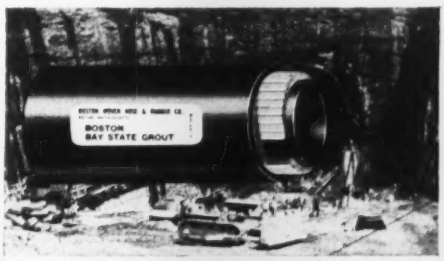
BOSTON AIR HOSE: For pneumatic tools, Boston has a specific hose for every use—from chippers to pile drivers. On heavy duty jobs most contractors use Boston's wrapped fabric hose (shown) or Boston's wire reinforced hose. Both offer long service life, unusual flexibility.



BOSTON WATER HOSE: As much as 72% more durable than other hose on tunnel, dam and bridge construction, Boston water, suction and jetting hose (shown) are tailor-made for every kind of construction job. That's why Boston water hose is dependable even when the going gets rough.



BOSTON STEAM HOSE: Your Boston Man has a complete line of pile driver hose, from 1½" to 2½". Every hose is specially designed to resist rough hammer action and deterioration caused by steam and oil. Boston also offers a wide selection of rugged hose for general steam service.



BOSTON CONCRETE HOSE: Boston's hose for handling cement, concrete and grout is engineered for long use under the toughest conditions. Boston Concrete Placing Hose and Bay State Grout Hose (shown) proved their worth on key projects like Queens Midtown Tunnel and the Delaware Aqueduct.

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Engineer's Dream:

Midway between and only 150 mi from Japan's two largest load centers, Sakuma hydro site offered 350,000 kw if a short 965-ft dam could be built 504 ft high across fast-flowing Tenryu River

Japan's Sakuma Project: Lesson in

(McGraw-Hill World News—Tokyo Bureau)

One day in the next few weeks, the last bucket of concrete will be poured into a 504-ft-high dam across a narrow, jagged-face valley in Japan, and a 20-year dream, of which most Japanese engineers had despaired, will be fulfilled. And in the fulfillment process, the Japanese laid some claims to world records for tunneling and concreting.

The dream was to develop an almost ideal hydro site on Japan's most strategically located power-producing river. This river, the Tenryu, roughly bisects a straight line between Japan's two principal industrial cities and greatest load centers, Tokyo and Osaka. Its flows, up to 210,000 cfs in flood, are comparable to those of the Delaware River. Over a 100-mi length, the Tenryu drops 2,400 ft.

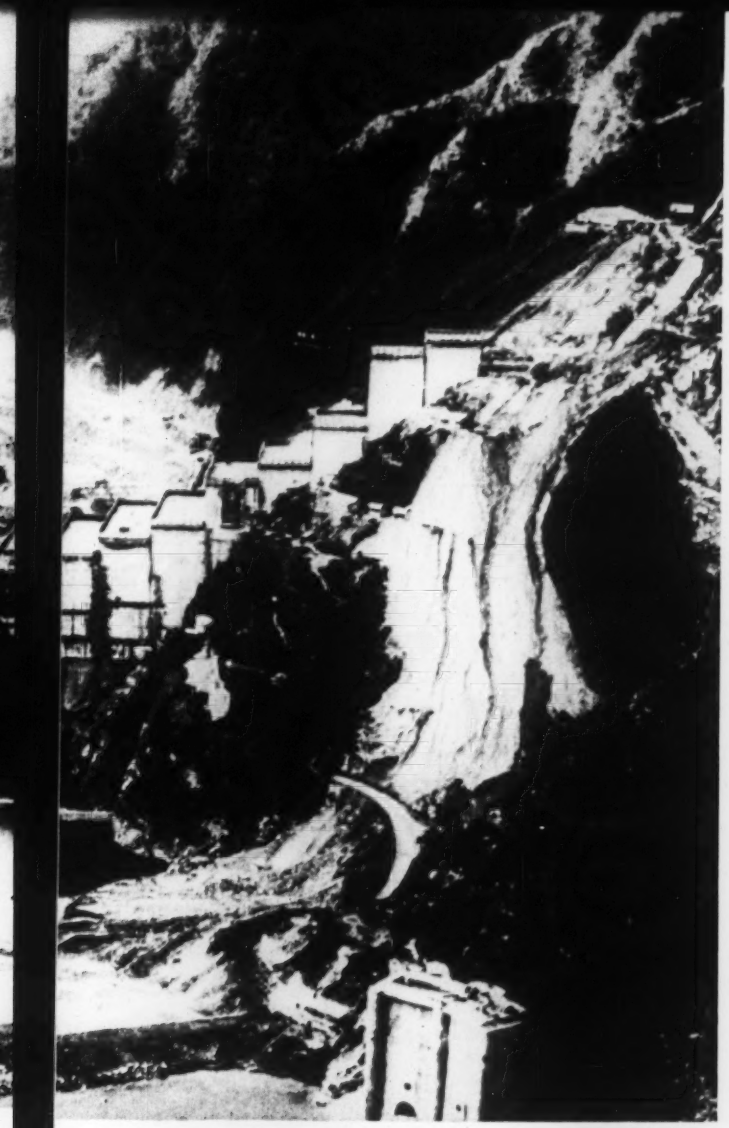
The dream site, at Sakuma, is almost on the straight line between Tokyo and Osaka, 150 mi from each. Japanese electric power planners saw that here a 504 ft dam with a relatively short crest length, 965 ft, could harnass a 450-ft drop over 20 mi of river. It could impound 265,000 acre-ft of water in only 2.8 sq mi. Because of its great depth, the reservoir would not be troubled by sedimentation. Because of the small lake and barrenness of the up-country, only 250 homes and a few farms would be inundated by the reservoir.

The visionaries also noted several construction advantages. Two railroads existed within three miles of the site, and the entire aggregate requirement for the project, almost 2,000,000 cu yd, was available only 1½ mi downstream.

But there always loomed a seemingly insurmountable obstacle: the granite hills of the Tenryu Valley whose slopes are often too steep even for a mountain goat.

By 1953, additional power for the Tokyo and Osaka industrial complexes became imperative. Thermal power was becoming more and more expensive because of dwindling supplies of coal. Fourteen less formidable sites along the Tenryu and its tributaries had been developed to the extent of 155,000 kw. As conceived, the Sakuma site could provide 350,000 kw.

One man, Tatsunosuke Takasaki, then president of the quasi-governmental Electric Power Development



Constructor's Nightmare:

But the granite hills of the Tenryu Valley, whose slopes often defy even mountain goats, made the Japanese hold back . . . until three years ago when they decided to combine native labor with the biggest of American equipment

Big-League Dambuilding

Co., refused to recognize the "impossibility" of the Sakuma site and managed to prevail over stern opposition.

• **Bring in Americans**—At about this time, the Guy F. Atkinson Co. was completing Pine Flat Dam on the Kings River in northern California. Pine Flat and proposed Sakuma dams were very similar—tall concrete gravity structures in rugged mountainous country.

So in April 1953, the Japanese and Americans got together on a contract calling for Atkinson's services as a consultant and as supplier of large quantities of U. S. construction plant and equipment. The next month, work on the dam began.

By October 1953, a low-level cliff-side road and a suspension bridge over the river were completed and heavy equipment moved in for work in the diversion tunnels. A high-level road to the batch plant and cableway sites, featuring seven tunnels totaling 3,800 ft in length, was readied in March 1954.

Other transportation work involved relocating nine miles of railroad track, chiseling a six-mile road, out of the valley walls and erecting a railroad bridge across the river about two miles downstream from the dam to facilitate delivery of equipment.

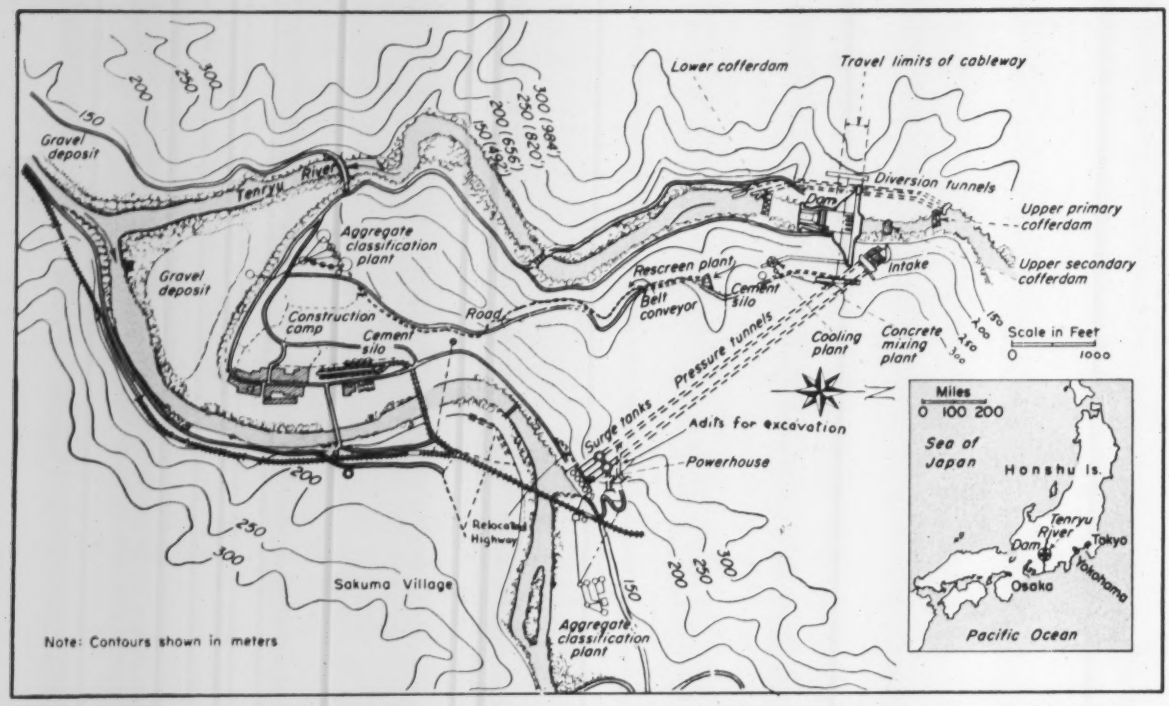
• **Large diversion tunnels**—Large diversion capacity was required to handle the possible river flow of 210,000 cfs. Two 37 ft dia tunnels, each 2,200 ft long, were therefore started in November, 1953 and, by the use of a 2-cu yd shovel with modified boom to load muck at the heading face directly into 12-cu yd dump trucks, they were completed in February 1954.

A 6x8-ft pilot drift was driven at the top of each heading, ahead of full-face drilling. This eliminated the need for special ventilating equipment and provided convenience in scaling the roof after blasting.

For the main heading blast holes were drilled from a 4-deck steel jumbo equipped with 15 hydraulically-operated booms to which were attached U. S.-manufactured drifters. The jumbo moved on rails spaced 14½ ft apart. Collapsible deck sections allowed the shovel and trucks to pass.

For each round, seventy-six 15-ft holes were drilled in a full face using 1¼-in.-dia steels with tungsten carbide bits. An average of 1.75 lb of 28% ammonia blasting gelatin was used per cubic yard of rock to be broken.

Daily advances averaged 21 ft. But



SITE LAYOUT depicts difficult terrain. Adits at surge tanks and tunnels enabled belt conveyance of muck to side hill dump.

. . . Sakuma Dam

at one point, for seven consecutive days daily advances of 30 ft were achieved. Allowing for the pilot drift, this converts to 30,810 cu ft of rock per day, just short of a world's record but even more remarkable considering the full-face blasting in headings this size had never before been attempted in Japan. Taking into account number of drillers, the Japanese output of 2,055 cu ft per day per driller is second only to Australia's 24-ft-dia Eucumbene Tunnel (see page 172).

The excellent quality of rock made necessary the lining of only a few short sections. In these, concrete curbs were poured first to provide both a track bed and anchor for the arch forms. Then a gantry frame supporting 24-ft sections of collapsible steel forms rode in.

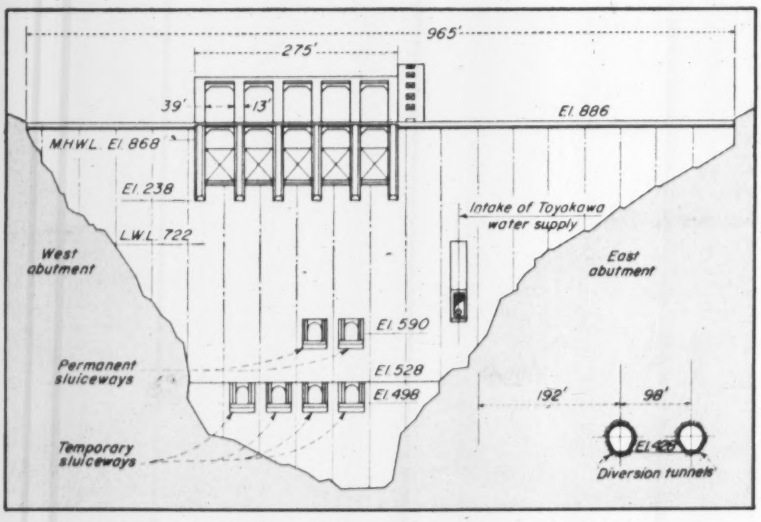
A single concrete intake structure serving both tunnels was built inside a small temporary cofferdam. The intake was fitted with a steel gate that could close off either tunnel.

River flow was turned through one completed tunnel in March, 1954 by a quickly placed rock and gravel dike. A similar fill was placed 1,500 ft downstream, beyond the dam foundation, and then both dikes were enlarged and faced with concrete. As a precaution, another upstream cofferdam (labeled as secondary on an accompanying drawing) was built.

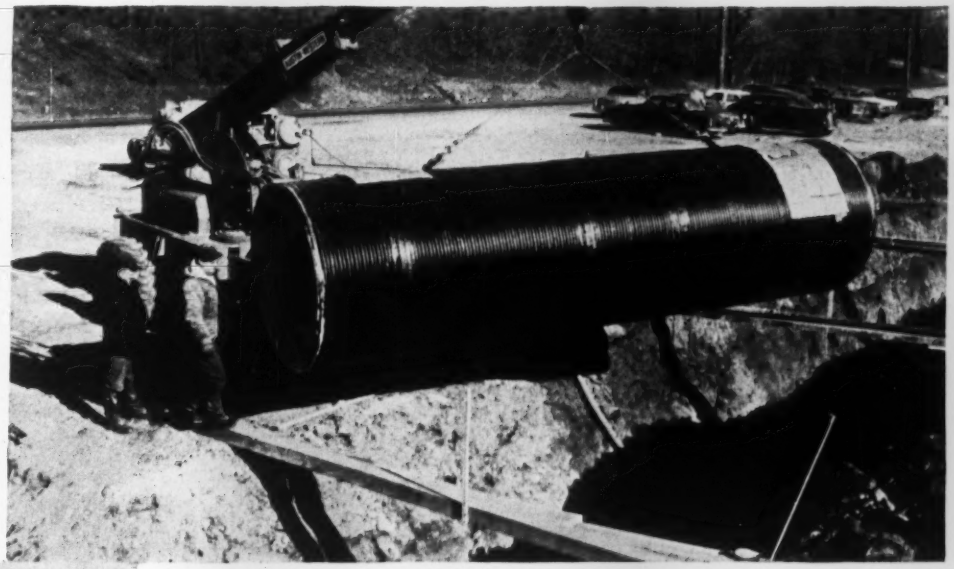
• **Remove gravel overburden**—By May, four 20-in. centrifugal pumps had dewatered the cofferdam, and foundation excavation began. Conventional high scaling, drilling and blasting methods were employed on the steep abutment slopes, but wherever possible, wagon drills worked from benches on the hillsides. Power shovels worked the riverbed itself.

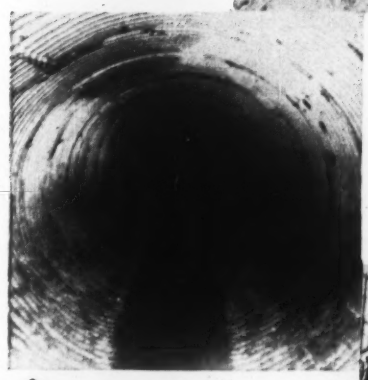
The narrow canyon at the damsite offered very limited disposal areas. Dumps had to be built against canyon sides and the waste often had to be hauled up 20% slopes. Still, 500,000 cu yd of overburden, which extended 75 ft below the riverbed, was removed in 133 working days.

Placement of concrete began in November, 1954 with a six-week grouting program. High pressure grout holes form the principal cut-off curtain which angles downstream from the upstream toe 20 deg from the vertical. Also grouted were an auxiliary cut-off curtain, leakage stop and primary and secondary blankets over a width of 115 ft from the upstream toe.



DAM ELEVATION shows steep side slopes. Gates can pass 353,000 cfs.





This Armco Sewer has served nearly a half-century and has a life expectancy of many more years.

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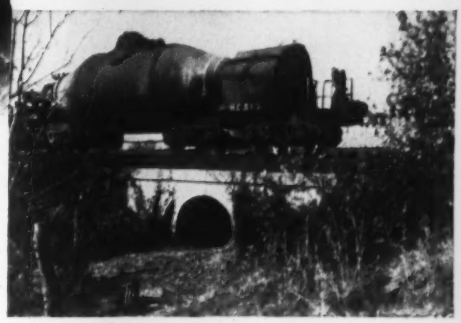

The 346-ton wheel load of this ladle car has traveled over this 6-foot-diameter Armco Corrugated Metal Pipe several times daily for 29 years.

Armco Corrugated Metal Structures combine both material and structural durability for balanced design. Any sewer structure needs both of these durability features. One without the other is useless. If the sewer fails structurally, your investment is lost no matter how long the material lasts.

Armco corrugated metal construction features high strength with light weight. Bolted connector bands assure strong, tight joints.

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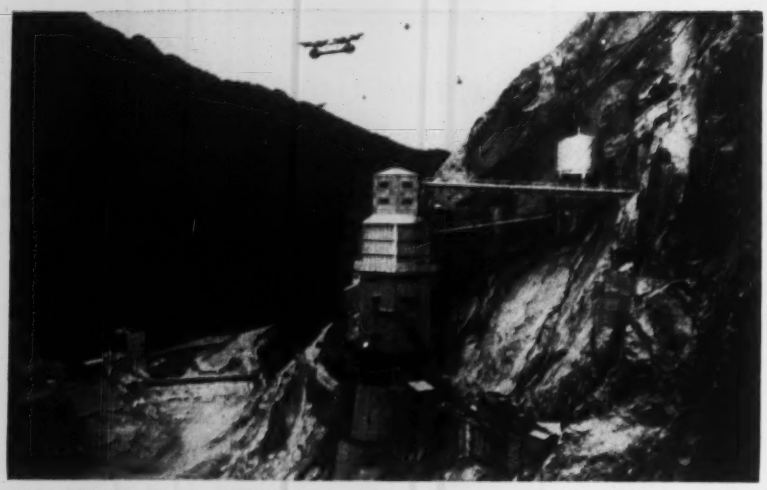
. . . Sakuma Dam: record tunneling, concreting

SHOVEL LOADING into 12-yd dump helped Japanese set near world tunnel excavation record of 30,810 cu ft per day in 37-ft-dia diversion tunnel.



6,775 CU YD IN 24 HOURS is concrete-placement record achieved by two 25-ton cableways with 8-yd buckets. This is probable world mark.

• **6,775 cu yd in a day**—The two 25-ton cableways with 8 cu yd buckets, which placed mass concrete at Pine Flat, were re-erected at Sakuma to handle a total 1,580,000 cu yd. One is a standard Lidgerwood rig and the other is the high-speed Willamette cableway introduced at the California project. Both operate from one set of head tower and tail tower tracks, which are parallel, straight, 393 ft long and 1,265 ft apart.

They make possible the placing of 86% of the mass concrete without resort to a drifting line. The remainder of the concrete, in the apron and stilling basin, is placed from a fixed 15-ton cableway and a movable 5-ton high line, and also by attaching a drifting line on the downstream 25-ton cableway to enable upstream movement of the bucket on the fixed cableway.

The Lidgerwood rig has a three-drum hoist powered by a 500-hp ac motor. The high-speed Williamette cableway, permitting simultaneous hoisting and hauling of the bucket, is powered by four 425-hp dc motors whose speed is altered by amplidyne controls. Separate and simultaneous operation of the hoist and haul mechanisms permits fast re-rigging of the haul drum. The dc motors and amplidyne controls implement this advantage by operating the cableway at faster speed. Full details on this high-speed rig are given in ENR Oct 4, 1951, p. 38. In this same article it is pointed out that the Williamette cableway on the Pine Flat Dam placed 4000 cu yd in 24 hr with the Lidgerwood cableway assisting by performing the service operations.

The Japanese improved on this performance last January by placing 6,775 cu yd of concrete in a 24-hr period with the same two 25-ton cableways. This is probably a world's record for two cableways. Normal pouring is about 100,000 cu yd a month.

Japanese specifications for mass concrete strengths followed U.S. standards. Locally-produced Type II cement is used in the concrete which has an average 90-day strength of 5,060 psi compared to design stress of 4,420 psi.

Cantilever-type wood forms are used. At the joints, vertical tapered slots are formed by bolting thin lumber covered with 20-ga black iron to the cantilever panels.

• **Aggregate production**—Work on the aggregate and batching plants, and on the cableways for handling concrete, started in mid-1953. Aggregate source, located 1½ mi downstream from the dam, is a natural deposit of river run gravel covering 98 acres. Shovels and backhoes worked the source, loading into dump trucks which discharged directly into a grizzly hopper.

The crushing plant consists of one 20-in. grizzly, one 8-in. grizzly, two primary 32x42-in. jaw crushers, a 5x12-ft vibrating screen, a secondary 25x36-in. jaw crusher, an auxiliary cone crusher to make up deficiencies of larger size rock, and a number of 36-in. belt conveyors. Many of these units were of Japanese manufacture following U.S. makers' specifications. The plant discharged 6-in. maximum size rock.

The main screening plant produced up to 700 tons per hour of four sizes of coarse aggregate: 6-in., 3-in., 1½-in. and ¾-in. to #4 screen. Sand is processed in a separate plant of 200 tons per hour capacity.

A 6,400-ft belt conveyor, traveling through the aforementioned 3,800 ft of tunnel, takes the aggregate to the batching plant located high on the east abutment just downstream from the main axis of the dam. Along the belt conveyor, a rescreen plant cleanses and assures proper gradation of the gravel as it is delivered to the batch plant some 1,500 ft up the line. Auxiliary storage of 1,200 cu yd of gravel and 400 cu yd of sand is provided by bins forming the base of the rescreen towers.

• **Pine Flat batch plant**—The concrete batching plant set up at Sakuma was also transplanted from the Pine Flat project. Gravel storage bins, of 1,400 cu yd capacity, allow cooled air to be blown through the aggregates. A 10-in. pneumatic conveyor delivers cement from a nearby 300-ton silo which receives bulk cement by truck from a 4,000-ton storage plant on a railroad siding about three miles distant.

Four 4-yd mixers discharge into sep-

arate 4-yd holding hoppers which are controlled by air-operated bottom radial gates. The hoppers empty into an 8-cu yd transfer car similar to those used at Pine Flat. The car has a drum-type concrete hopper that rolls over and empties into a side-mounted chute, thence directly into 8-yd concrete buckets on the cableway. The car itself travels on a standard gage track and is powered by a flexible drag cable.

Specifications for mass concrete required that a placing temperature of 55 F be maintained, and that concrete in the lower third of the dam be cooled further by water circulating through embedded pipe. A cooling plant was built to deliver cold air to aggregate, chilled water to the embedded pipe and tube ice to the mixing water.

• **Tight-fitting powerhouse**—Excavation for the powerhouse was started in November, 1953. A cofferdam of log cribs filled with cobblestones successfully protected the work during flood seasons.

The plant, ultra-modern in design, is almost ready to go on the line, as its generators are now being load-tested. The difficulty of leveling space in this visible outcrop area forced the unusual design shown in an accompanying drawing. Main transformers are situated outdoors directly above the draft tube outlets. Switch gear is installed on a structural steel frame supported by the same columns carrying the roof and traveling crane in the powerhouse below.

All equipment installed in the powerhouse is of Japanese manufacture. There are four vertical Francis-type turbines, each rated at 128,500 hp. They each drive a three-phase synchronous generator having a rated capacity of 93,000 kva and capable of delivering 50 or 60 cycle power.

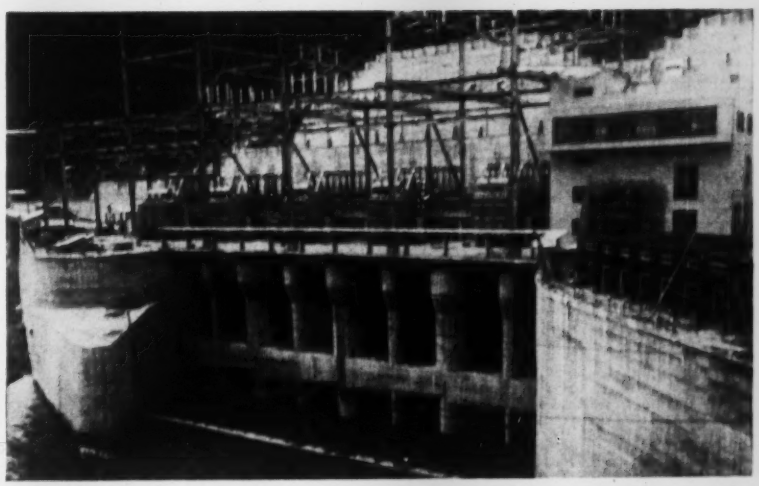
Four transformer units step up generated 13.2 kv to 275 kv. High transmission voltage enables economical delivery of Sakuma power to any load center on the main island of Honshu.

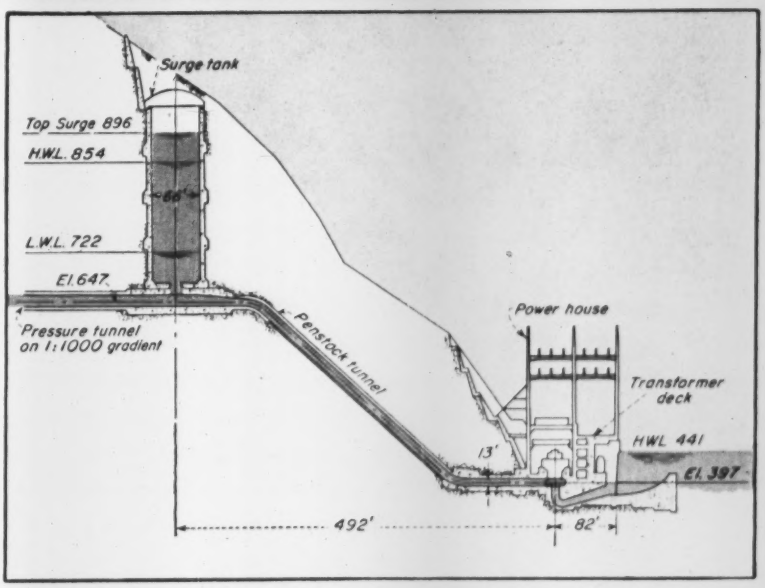
The four turbines will require 10,800 cfs of water at maximum plant operation. During the low-water season from December to March, the reservoir can furnish a firm supply of 3,450 cfs, which will permit the plant to generate 97,000 kw. In the winter months, the plant will serve peak loads while during periods of abundant water, it will operate on base load.

• **Pressure tunnels**—The powerplant's turbines receive water through two 23-ft dia 3,800-ft pressure tunnels that feed four 13-ft-dia penstocks at a bifurcation point. The pressure tunnels were driven toward their intakes starting from an adit driven from a side hill dump.

The two 27-ft-dia headings were worked together. In each there was a 13-boom jumbo sized for full-face drilling and to allow two sets of parallel track for muck loaders. A typical round required 95 to 110 blast holes 13 ft deep and 2.5 lb of ammonia gelatin per cu yd of rock. Maximum daily advance was 27 ft, with 16 ft per day averaged.

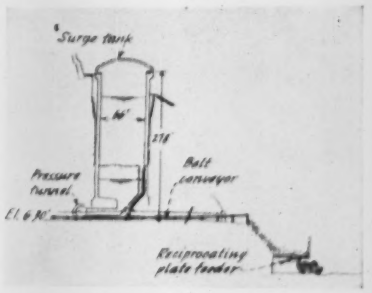
Full circle steel forms, supported on a needlebeam, were fabricated for placing concrete. Sections of 40-ft length were poured on a scheduled 48-hr cycle. Concrete was delivered in 2-cu yd buckets on a flatcar, then dumped into a pug-mill which charged 1½-cu yd concrete placers.





TRANSFORMERS AND SWITCHGEAR set on roof of powerhouse. Difficulty of site made this arrangement most economical.

• **Surge tanks**—Adjacent to the bifurcation point, each tunnel is connected with a 63-ft-dia surge tank, the two structures being almost entirely underground. Cost of building a road to



SIDE HILL DUMP scheme was used for surge tank and pressure tunnel excavation.

. . . Sakuma Dam

the top of the tanks would have been prohibitive, so a 10-ton cableway was erected to transport materials and equipment up the steep rock slopes.

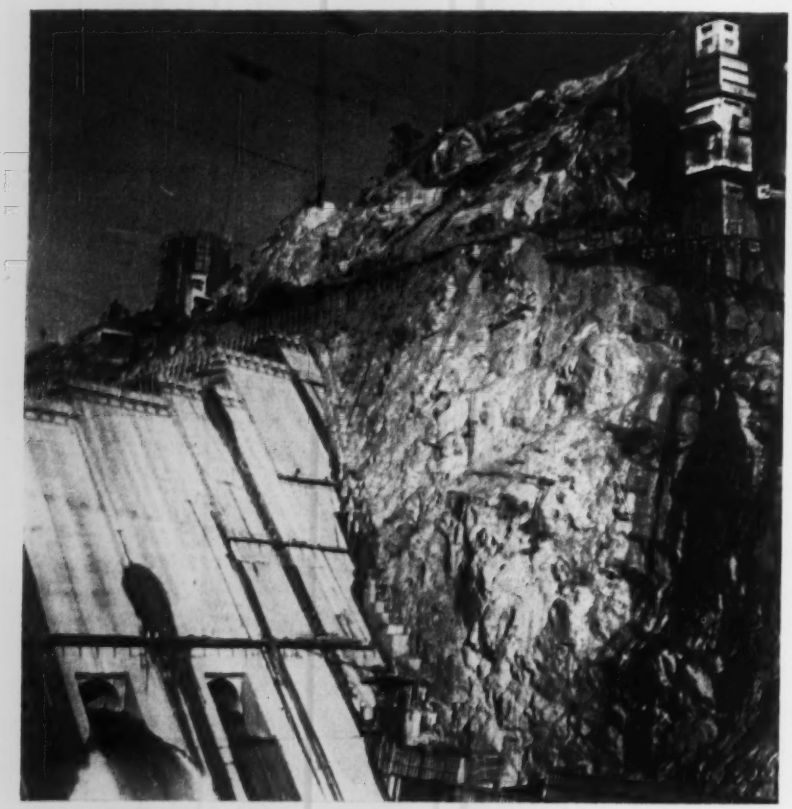
The construction schedule required that excavation be carried on coincidently in the surge tanks, pressure tunnels, penstocks and the powerhouse. While a bench was being excavated at the top of each surge tank, two vertical shafts, one for each tank, were driven upward from an access adit at the pressure tunnel level. These stopes then trapped the muck from full-diameter (79 ft) blasting that proceeded downward from the top of the surge tanks.

Only a half section of the tank area was drilled and blasted at a time, permitting a dozer and other equipment to remain in the hole. A pan-type feeder at the bottom of each shaft loaded the muck on a 48-in. belt conveyor serving both surge tank excavations. This conveyor, 450 ft long, discharged on the side hill dump that was used for the pressure tunnel excavation. An accompanying sketch shows how reciprocating plate feeders loaded 12-cu yd dump trucks.

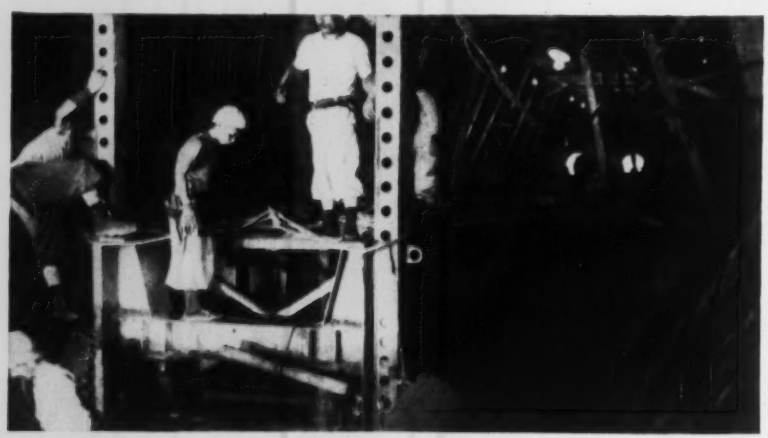
Much of the 320-ft-deep surge tank excavation is through fractured rock. To protect workers and prevent caveins, a concrete sub-lining was placed as the hole deepened. A full-circle jumbo, which was suspended by cables from a gantry that had been erected over the surge tank collar, served to form the concrete lining.

The plan for excavating the penstocks called for a temporary access tunnel to intercept the lowest grade of the four penstock tunnels. It was sized to accommodate 12-cu yd dump trucks. An 8x10-ft shaft was then driven upward along the inverts of the four penstocks.

Headings were driven from the bifurcation chambers, the muck dropping through the inclined shaft directly into waiting dump trucks. Needle-beam supported forms were employed for the lining with concrete being pumped into the forms. The steel lining sections were lowered into the tunnel from the bifurcation chambers and welded together in place.



UPSTREAM VIEW shows sheer granite slopes. Batch plant is at top right, intake towers at top left. Water is flowing through temporary sluiceways.



NEEDLE BEAM supports full circle forms used in concreting pressure tunnels.

• **Dream becomes reality**—After the second diversion tunnel was plugged with concrete last December, the Japanese witnessed their dream being fulfilled as water began to rise behind Sakuma Dam. Water flowed through temporary sluiceways and a five-gate spillway designed to pass 353,000 cfs. By midsummer the reservoir should reach high water level.

Sakuma Dam is rightly regarded with pride by the Japanese construction industry. Its workmen (there were 6,000 at peak activity) proved unusually proficient—witness the several records set—although a fatality total in the neighborhood of 150 casts a cloud on working conditions. Japan's engineers thought big and boldly on the job, whose planning and design were of their conception, as well as much of the construction.

American influence on the job was felt mainly where heavy U.S. equipment was involved. It was this equipment, however, that changed the project from "impossible" to feasible, and the Atkinson organization, headed up by Hugh Parker, Jack Broton and Richard Rofelty, was therefore an important factor. Other U.S. aid was in the form of a $7-million loan to the developing company by the Bank of America to purchase U.S. equipment. Also $50.7 million came from a Japanese government fund accruing from the sale of U.S. surplus agricultural products. Total cost of the project will reach the yen equivalent of $90 million.

Thirsty South American cities get more water with Dresser-Coupled steel lines!

SANTIAGO, Chile—Water—available water—is reported to be a major problem facing cities throughout South America. Rapid population growth and the expansion of industry are the springboard for many large-scale water development projects.

Often, water supply lines are placed in extremely rough terrain with local unskilled labor. This common problem has led engineers to accept new techniques and materials. Steel pipe joined with mechanical couplings has proved for many cities the ideal answer to both faster job completion and simplified engineering.

Strong, yet lightweight steel pipe is easier to haul and handle at the job site. And long lengths of steel pipe have great beam strength, important in bridging ravines. The built-in flexibility of Dresser Couplings helps fit the pipe to natural ground contours. Ordinary labor can make 100 per cent tight joints, using only wrenches.

Illustrated are four typical South American steel water lines joined with Dresser Couplings.

Ecuador, Quito. First ever in Ecuador's capital, this Dresser-Coupled steel line will deliver water over 600 kilometers. Begun in 1949, for completion in 1956, installation schedules have been held despite adverse conditions—including heavy mud, cave-ins, hand-dug ditches. Engineering by Harold T. Smith, Inc.

Venezuela, Caracas. This 49½" diameter pipe line was laid through some of the most severe terrain in Venezuela . . . in some cases pipe had to be transported and laid by aerial tramway. The 17-mile Dresser-Coupled line was laid at an average of 32 lengths a day. Engineering by Dr. Jesus Pieretti.

Colombia, Municipio de Tunja. Extending 36,740′ through rugged, mountainous country, this 14" Dresser-Coupled steel line was installed during the rainy season. Completed in only six months, the unskilled, six-man crew laid an average of 20 lengths of pipe each day. Engineering was by Marco Antonio Molina.

Chile, Antofagasta. One of the longest water mains ever built, this municipally-owned Dresser-Coupled steel pipe line extends 125 miles. The city of Antofagasta built the line to provide much-needed drinkable water for its growing population. Diameter of this water line varies from 16" to 26".

Wherever water flows, steel pipes it best. **Always put steel pipe and Dresser Couplings in your specifications.**

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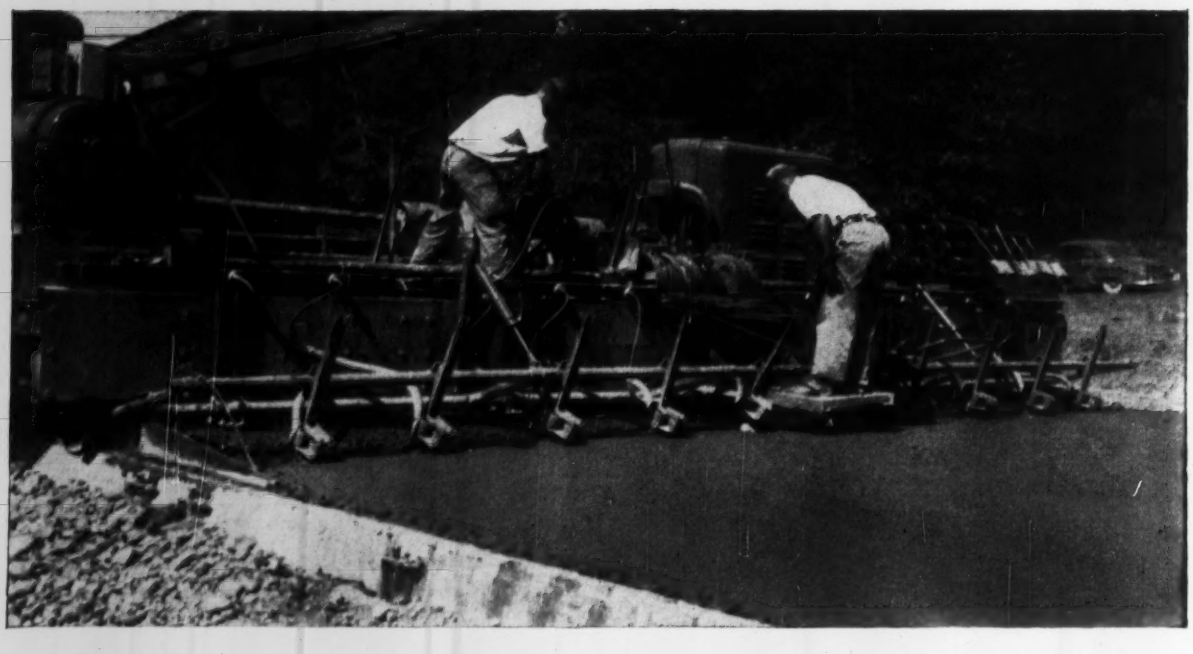

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Maginniss Hi-lectric internal full slab vibrators operate completely immersed below concrete surface—provide uniform vibration throughout the slab. This uniform internal vibration assures a homogeneous mixture of aggregate and mortar from base to surface of slab—produces better concrete. And, actual internal vibration with Hi-lectrics speeds concrete distribution—leaves surface semi-finished—cuts finishing time—increases pavement production!

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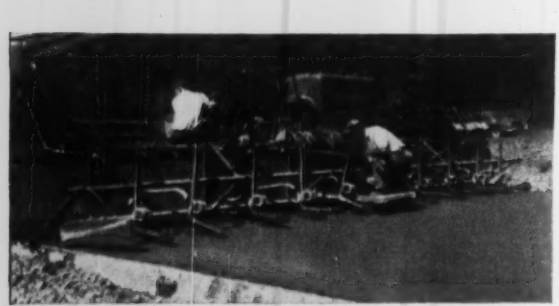
The lightweight Hi-lectric attachment mounts directly on the spreader or finisher—requires no auxiliary carriage. Machine operator controls vibrator position, operation and frequency to suit consistency of concrete and other job conditions. Slabs up to 25 ft. wide and from 4 to 19 in. deep can be vibrated efficiently and economically.

Find out how *uniform internal vibration* can improve concrete quality, speed production, and cut costs on your airport or highway paving jobs. For full information, call your nearest Maginniss distributor. He's listed in the Yellow Pages under "Concrete Vibrators." AA-2958



Uniform vibration of this 24 ft. x 9 in. highway pavement slab was provided by 10 Maginniss motor-in-head vibrators spaced 28 in. apart. Center dowels were accurately positioned at proper depth by dropping them ahead of two center vibrators.

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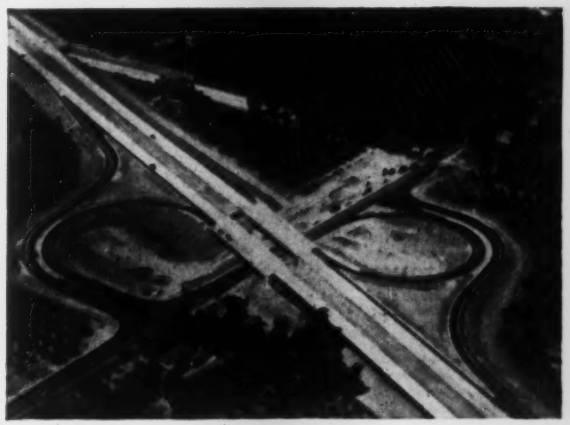


Find Points on Vertical Curves

H. J. Rebase
Department of Main Roads
Sydney, Australia

In my work for the New South Wales State Department of Main Roads, Australia, I have developed formulas for determining points on vertical curves. These practical formulas, which are easily derived, simplify the work and so could beneficially be added to the various formulas appertaining to vertical curves in highway designers data books.

The tangent grade at any point on a given parabolic vertical curve (drawing fig. 1) may be found by:

$$g_a = g_1 - \frac{Xg}{L} \qquad (1)$$

And for the difference in elevations of points PC and A, this applies:

$$d = \frac{X}{200}(g_1 + g_a) \qquad (2)$$

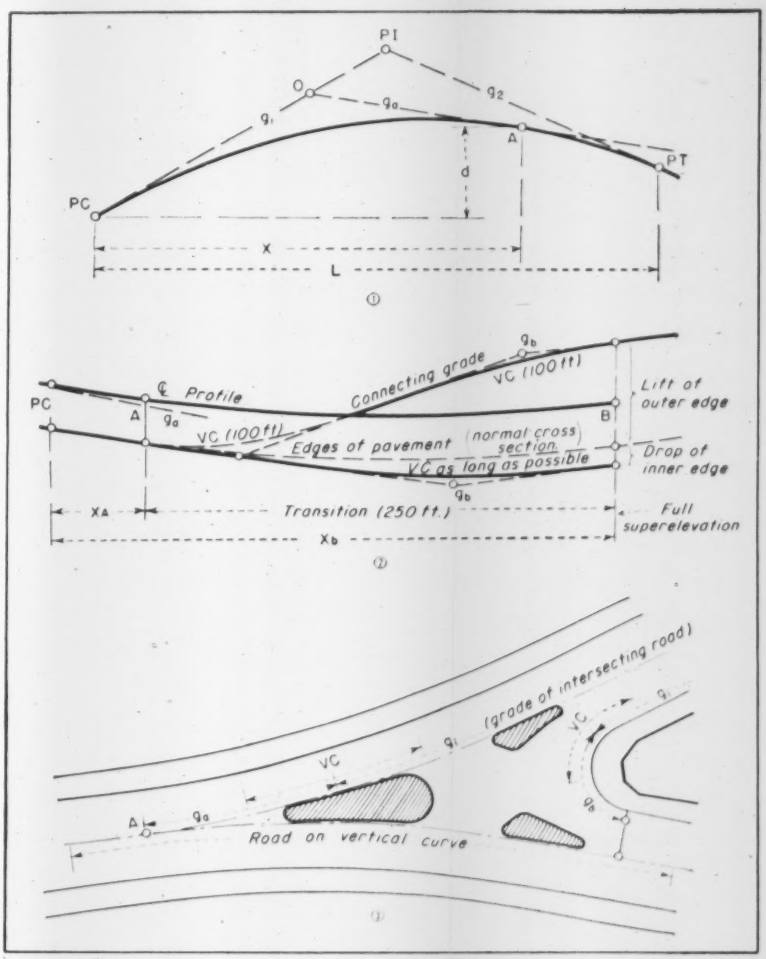
where, g_a = tangent grade at A (any point on the VC) in percent
g_1 = grade tangent at PC in percent
g_2 = grade tangent at PT in percent
$g = g_1 - g_2$ the algebraic difference in grade
X = any distance from PC in feet
L = the length of the curve in feet
d = difference in elevations of points PC and A, in feet.

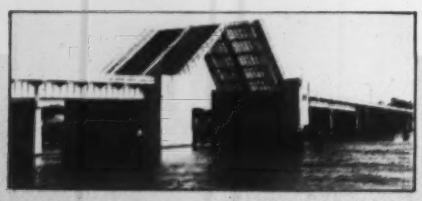
The above formulas, with due regard for the algebraic signs of the grades, are valid for all cases of convex (summit) and concave (sag) vertical curves. They are derived as follows:

Due to the properties of a simple parabola, the rate of change of grade $\frac{g}{L}$ is constant on the entire length of a vertical curve. Thus $\frac{g}{L} = \frac{g_1 - g_a}{X}$, from which $g_a = g_1 - \frac{gX}{L}$, as above.

The elevation from PC to 0 is $\frac{X}{2} \times \frac{g_1}{100}$ and from O to A is $\frac{X}{2} \times \frac{g_a}{100}$ And $d = \frac{Xg_1}{200} + \frac{Xg_a}{200} = \frac{X}{200}(g_1 + g_a)$ as above.

It should be noted that on vertical





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curves at the highest (summit) point, or the lowest (sag) points, the tangent grade g_a is horizontal. Therefore, $g_a = g_1 - \frac{Xg}{L} = 0$

From this equation X is found, thus providing the following much used formula:

The distance from PC to the lowest or highest point on the vertical curve is given by $X = \frac{g_1 L}{g}$ (3)

The difference in elevations between the low or high point and PC is given by $d = \frac{Xg_1}{200}$ (4)

The first two formulas can be applied to many types of road design.

An example is the design of transition from normal cross section to full superelevation when the start, end or whole of the transition is within the limits of a vertical curve (drawing fig. 2).

If the tangent grades g_a and g_b intersect within the limits of the transition, only one connecting vertical curve (with maximum possible length) will be required, provided the permissible rate of change of grade on this curve is not exceeded.

When g_a and g_b intersect too close to either end of or outside of the transition, two reversed vertical curves (with or without a short straight between them) will be necessary. However, in some cases it is possible to avoid reversed curves by lengthening the transition.

Another example is found in the design of road intersections which are within a vertical curve. Here, formula (1) gives an instantaneous grade along either of the intersecting roads. This formula applies particularly to the grading of curb lines around all types of road intersections (drawing fig. 3).

Washington's Sewage Plants Will Fill State's Needs

When sewage disposal plants in Seattle and Spokane are completed, Washington state "will be pretty well along the road to 100% sewage treatment coverage for the present population," in the words of E. F. Eldridge, director of the state pollution control commission.

Eldridge says Washington has 156 sewage treatment plants operating, serving 631,000 persons. Before 1949, Washington had only 62 treatment plants for 263,000 persons.

Spokane and Seattle both are working on disposal systems and plants to serve major segments of their populations. Eldridge said 48 other communities are planning to install treatment plants.

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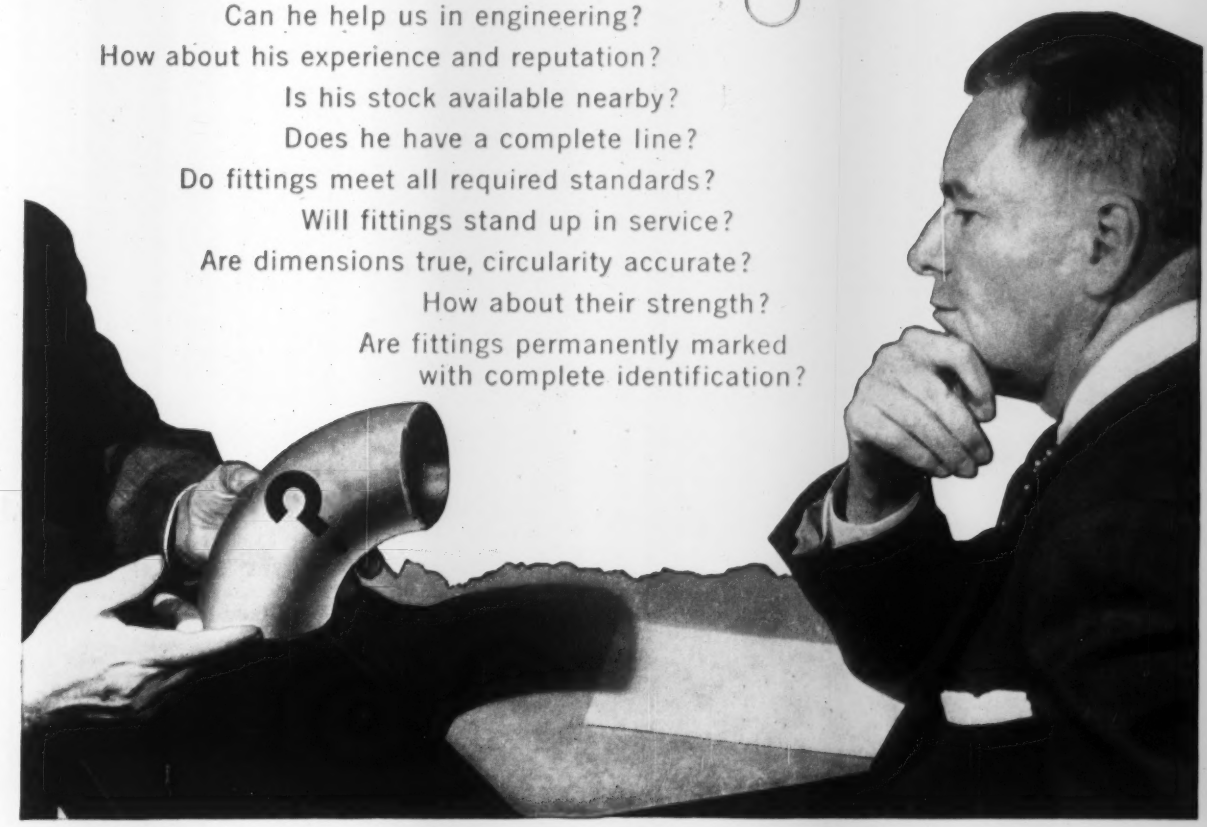

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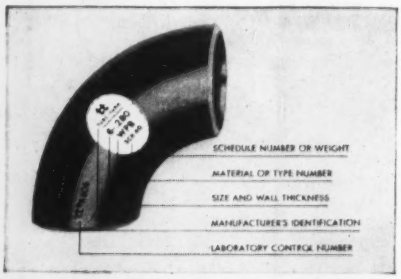

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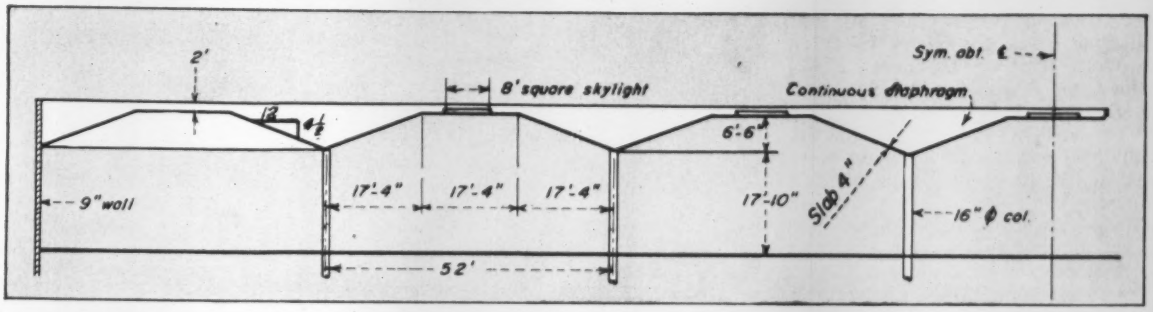
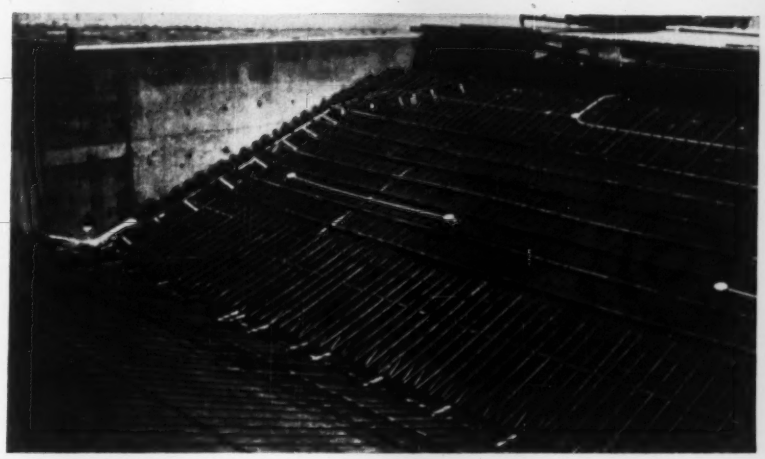
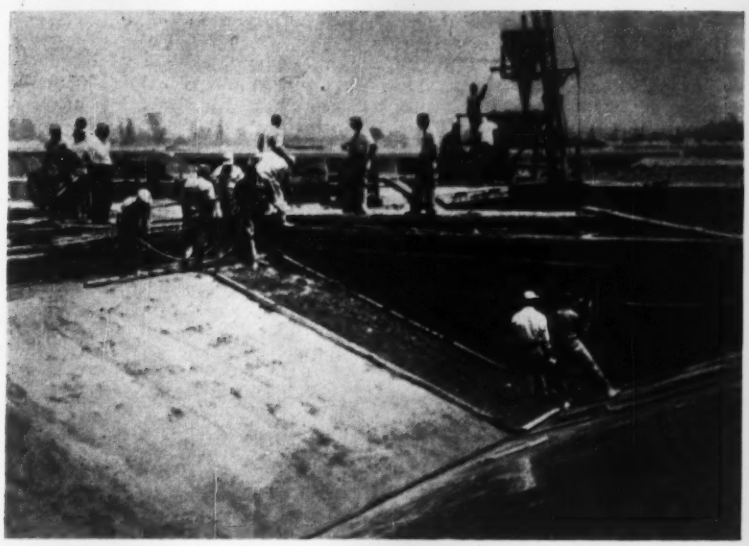


Thin slabs are formed into a space-structure and prestressed so that . . .

Folded Plate Roof Spans Big Bays



STRAIGHT TENDONS were laid in the forms to post-tension the folded-plate roof. Consisting of parallel-wire cables, they were anchored at the end walls.



CONCRETE with low slump was placed from buggies. The mix stood without trouble on the 4½:12 slopes of the thin-shell roof.

The concrete roof of the new Langendorf Bakery in Los Angeles, though only 4 in. thick, spans 52 ft, providing unobstructed bays 171 ft long. Yet, cost-in-place was only about $1.50 per sq ft.

The low construction cost resulted from use of:

- Folded-plate construction
- Lightweight aggregate
- Prestressed concrete

The one-story plant has a total floor area of 127,500 sq ft. Of this, 62,300 sq ft is roofed with thin-shell concrete, 365x171 ft in plan. The remainder of the plant is roofed with steel and wood.

Roofs are supported along the outside of the building on 9-in.-thick bearing walls with a constant height of 26 ft 4 in. above the finished concrete floor. The walls are constructed of 2,500-psi stone concrete.

• **Long-span shells**—Inside, the folded-plate roof is supported on two rows of 16-in.-dia spiral-reinforced concrete columns. The rows are 60 ft apart. Columns in each row, set under the valleys formed by the concrete roof plates, are spaced 52 ft c-c.

In each bay, the 4-in. roof consists of a horizontal center slab and two slabs sloping down and away from it with a 4½:12 pitch. All have a horizontal projection of 17 ft 4 in. This "barrel" is part of a three-span continuous flexural member, with interior span of 60 ft and end spans of 55 ft.

To stiffen the thin shells and distribute the folded-plate reactions to the columns, concrete diaphragms are placed along each of the two column rows. In addition, the diaphragms are prestressed to resist unbalanced horizontal thrust from end bays. To resist the combined stresses from shell action in an economical manner, it was necessary in the two

end bays to project the two diaphragms below the plates to valley level—18 ft above the floor. Elsewhere, the diaphragms are above the roof.

To daylight the interior of the building, four 8x8-ft openings were left in the horizontal plates in the interior bays. These skylights are glazed with heat-resistant glass.

In addition to low cost, this type of roof was chosen because:

- It is incombustible, thus permitting unlimited area without interior fire-wall separation.
- It is a rigid horizontal diaphragm; so no supplementary horizontal bracing is needed to resist earthquake forces.
- It is sanitary, presenting no projections where dirt might collect.

The plans and instructions to bidders indicated clearly how the formwork for the roof was to be placed. Construction joints were located along the valleys, with the intention of having one complete 52x170-ft bay (120 cu yd) concreted in a day. The contractor was required to support the shell along fold lines until it was prestressed; hence, the plans included a detail indicating the forms and shoring to remain after slab forms were stripped. Width of slab forms was set at 16 ft to eliminate the need for cutting up standard-size panels.

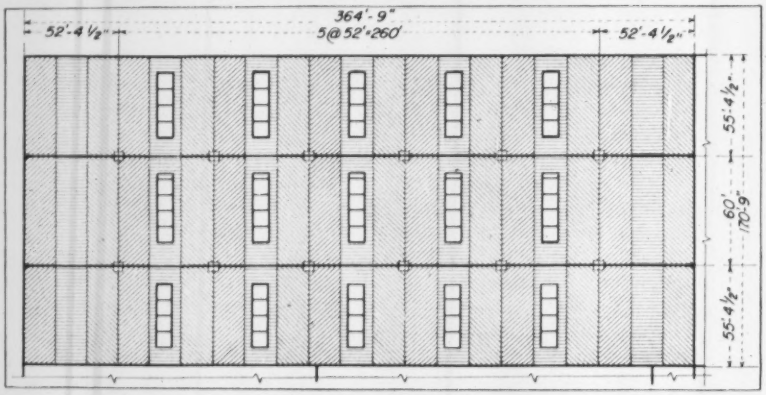
• Concreting procedure—Construction of the folded-plate roof started as soon as floor, walls and columns were in place. The contractor elected to provide sufficient forms for two complete bays. This enabled him to set the steel for one bay while concrete was placed and cured in an adjoining bay. As a result, one 52x170-ft bay could be concreted every ten days.

Re-used as forms two to three times, the plywood panels, still intact, were employed again as permanent sheathing for the wood roof outside the production area. This scheme resulted in exceptionally low forming cost for the concrete roof.

Prestressing steel, sheathed to prevent bond with the concrete, was set on the forms with the reinforcing steel. A total of ten 12-wire cables was used in each sloping plate. Wires are 0.196 in. in dia and have an ultimate strength of 250,000 psi.

Theoretically it appeared economical to curve the cables up and down in accordance with bending moments in the plate. However, because friction losses due to cable curvature could reduce the effective prestress where needed to a small fraction of that applied, the cables were laid straight. Though more tendons were needed, steel costs still were less than for conventional reinforcing.

INSIDE daylight is provided by skylights in the thin shell. Concrete columns, which were cast in paper forms, support the roof along the valleys.



CONCRETE ROOF, in effect, consists of three-span, thin-shell "barrels" composed of one horizontal and two sloping slabs with equal horizontal projection.

Anchorages are located at the ends of the barrels, at the outer walls of the building. Conical wedges (Freyssinet method) were selected to anchor the cables because they required no projections on the outside face of the walls. Holes in the walls, to provide access for the double-acting jack that tensioned the tendons, later were dry-packed and finished to match the rest of the exterior.

• Why prestress?—The decision to prestress was based on previous experience with single-span folded-plate roofs. Among the advantages are:

- Reduced shell deflection
- Elimination of welding of main reinforcing and the attendant danger of a weld fracturing in service.
- Elimination of temperature steel transverse to slab reinforcing.
- Reduction or elimination of stirrups.

Plastic flow of the lightweight concrete is a disadvantage, because of the greater amount of prestressing steel needed to overcome the stress loss. However, it is not too significant a factor because: (1) the roof is post-tensioned, so stress losses due to normal concrete shrinkage are almost entirely eliminated; (2) thin-shell flexural stresses are low (10% to 30% of the allowable compressive stress), and since plastic flow is a function of the magnitude of the stress, loss of stress due to it will also be small; and (3) losses due to creep of steel may be reduced by overstressing the cables in the tensioning operation—which has the additional advantage of overcoming more of the friction between wires and sheaths.

Finally, the decision to prestress depended on whether elimination of other shell reinforcing made it economically desirable.

• Lightweight concrete—Specifications called for a 3,000-psi concrete with a density of 95 lb per cu ft, made with 6 sacks of cement, lightweight sand, $\frac{3}{8}$-in. size aggregate and 1-in. aggregate in the proportions 1:1.71:0.63:0.78.

The lightweight aggregate selected is an expanded shale coated with a

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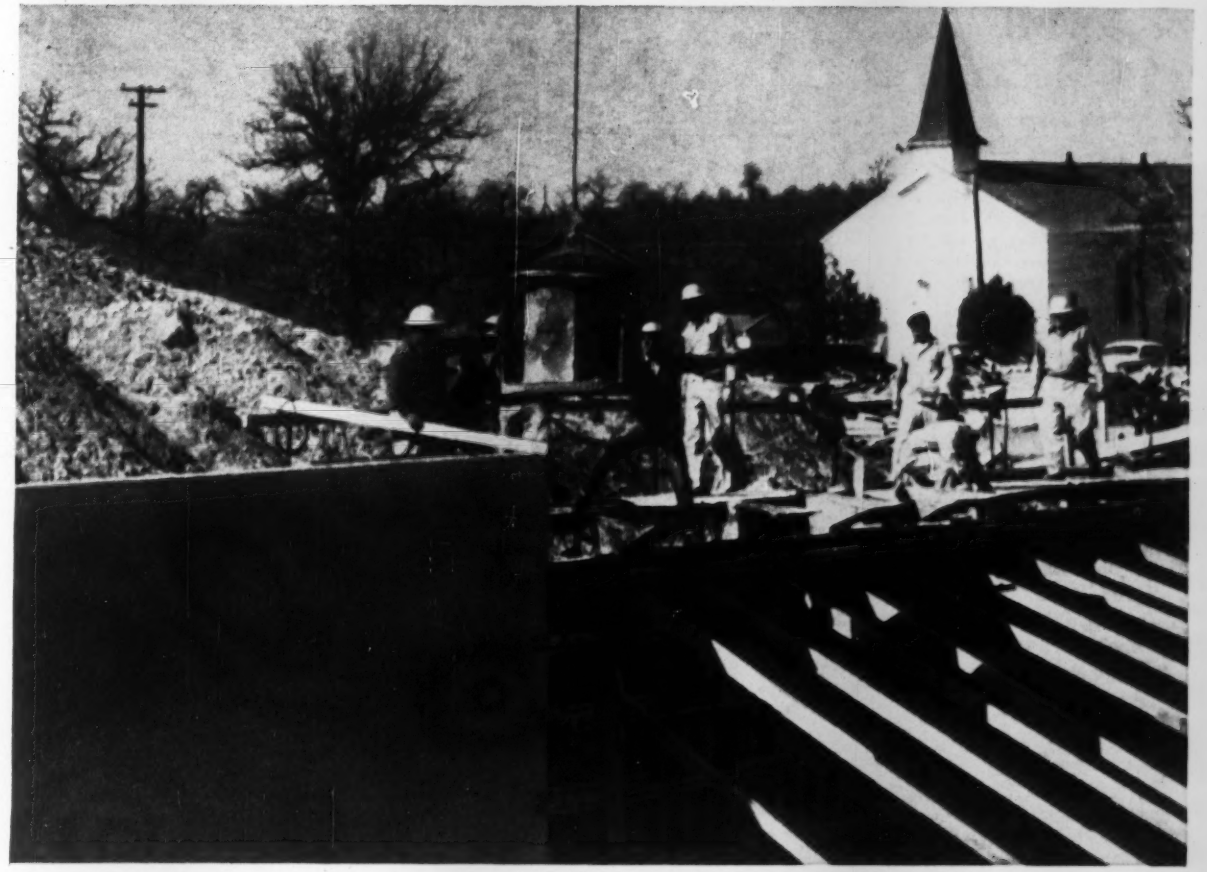

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- **Provides 8 to 10 re-uses** from your forms before re-coating with Form-Saver!
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ceramic glaze. Compared with uncoated particles, it has much less absorption and yields a mix that is far easier to control.

A plasticizing admixture was included in the mix. Saturated cylinders weighed just over 100 lb per cu ft. Seven-day strengths ran about 3,000 psi, whereas 28-day strengths exceeded 4,000 psi, some cylinders testing as high as 5,300 psi.

Concrete was delivered to the job in truck mixers and hoisted to roof level in buckets by a crane. Dumped into a hopper, the mix was then fed to buggies that traveled along runways on the horizontal slabs and discharged into movable chutes over the forms.

No difficulty was experienced in placing the concrete because of the slope of the slabs. Reinforcing steel and spacers acted as keys that prevented the concrete from sliding, even under vibration. Also, for ease of finishing and to prevent segregation, slump was kept low—from 1 to 3 in.

Sparingly vibrated, the concrete was given a medium-smooth finish with wood trowels. It was cured with a sprayed-on compound.

When the concrete attained design strength – usually in seven days – the tendons in the slabs could be prestressed. Then, the fold-line forms were stripped. However, until the diaphragms were prestressed, after the entire roof was concreted, intermittent support had to be maintained.

All tendons were pressure grouted after they were anchored. This practice is desirable for several reasons: Reliance is not placed permanently on the anchorages; should they be damaged in the future, no harm results. Interaction of prestressing steel and concrete increases the safety factor against overloads. And if the full design prestress is not attained at some point because of unanticipated friction losses, the tendons are not stressed to design value and therefore have reserve strength to act, in part, as conventional reinforcing.

Roof drainage was provided for in the folded-plate construction by placing lightweight concrete fill (35 lb per cu ft) in the valleys to form saddles. Drains passing through the diaphragms carry the water to the outside walls. There, collectors and downspouts dispose of it.

Bennett & Bennett, Pasadena, Calif., were the architects. John J. Driskell, San Gabriel, Calif., was the structural engineer. With Norman Barber as general superintendent, H. J. Daum constructed the building under a $953,500 general contract ($7.47 per sq ft). Exclusive of mechanical and electrical installations, unit cost of the structure averaged $5.70 per sq. ft.

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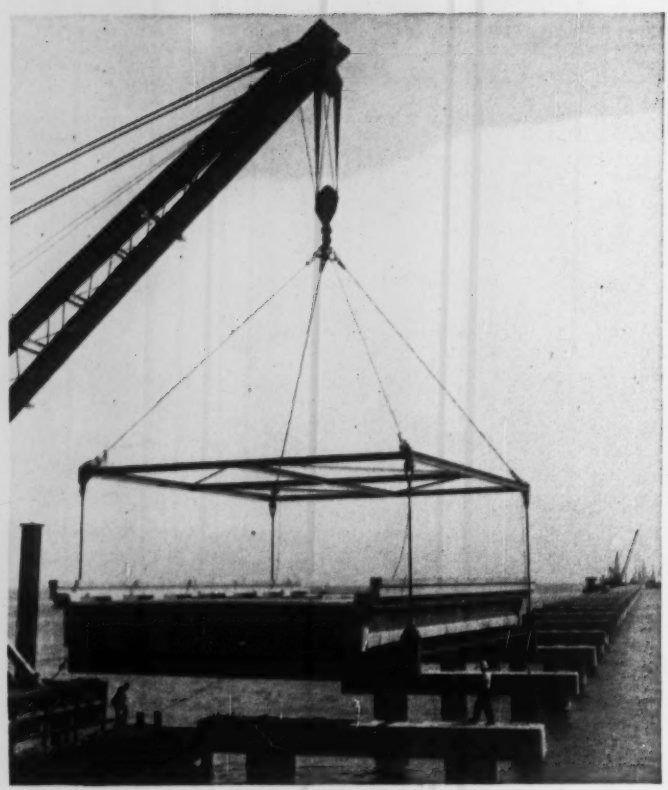

It's pushing across open water at a record pace of ½-mile a week. It's the world's longest vehicular bridge. And it's also the world's most impressive example of the advantages of prestressed concrete construction pretensioned with Union TUFWIRE strands.

The concrete slabs are 56 feet long and 33 feet wide, precast complete with curb and gutter. This giant unit size is made possible by prestressing with 175 separate TUFWIRE strands. The slabs (see photo at left) are swung into place atop hollow, cylindrical prestressed piles 54 inches in diameter.

Requirements for the causeway were: low initial costs and maintenance; high degree of strength and permanence; extremely fast construction to minimize delaying action of frequent squalls, fog and rough water. *Prestressed concrete was the answer.*

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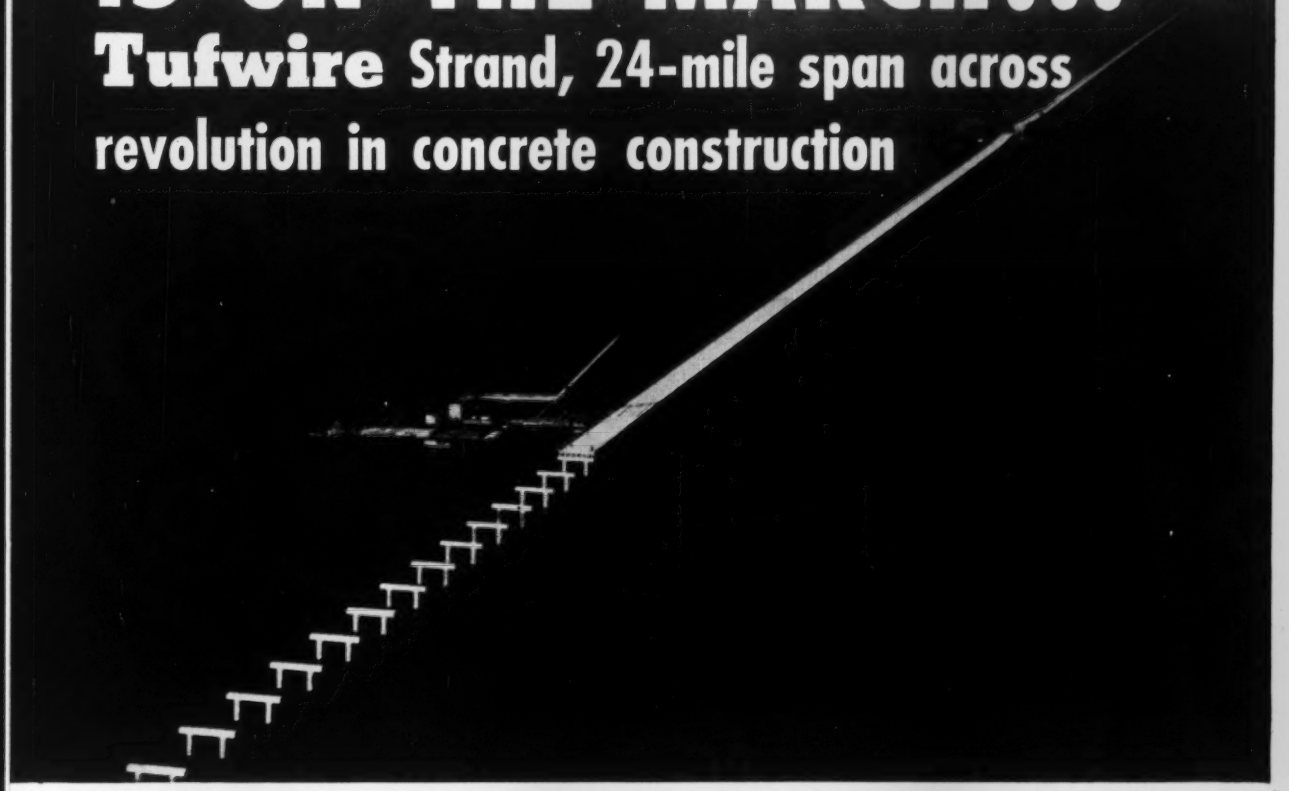

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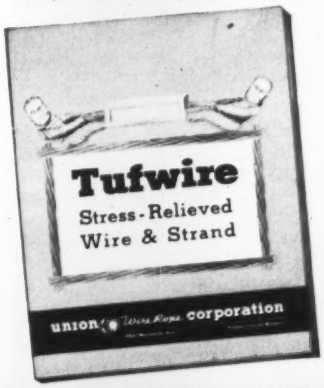

Prestressed concrete is finding a wide range of uses in buildings, bridges, and highways. A look at the "small item" end of the list turns up such products as movable curbs for parking areas, light poles and sign standards, fence posts and many another. Prestressed concrete's field of uses is as unlimited as the imagination of engineers and businessmen!

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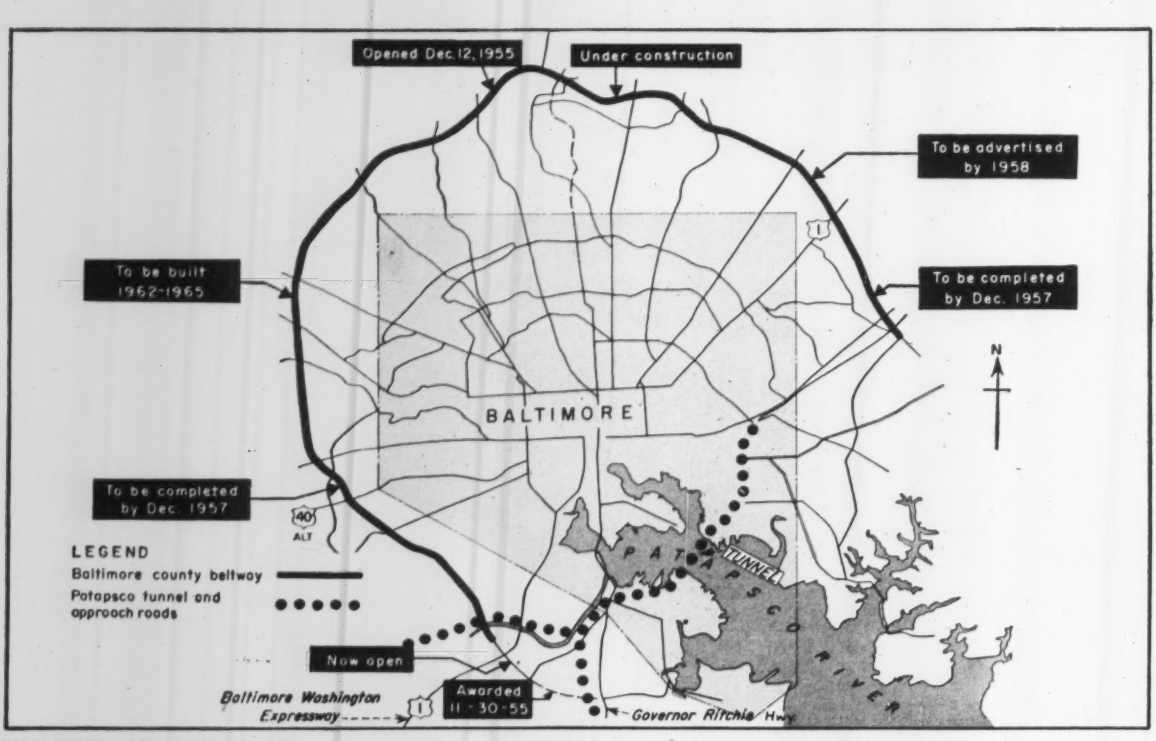
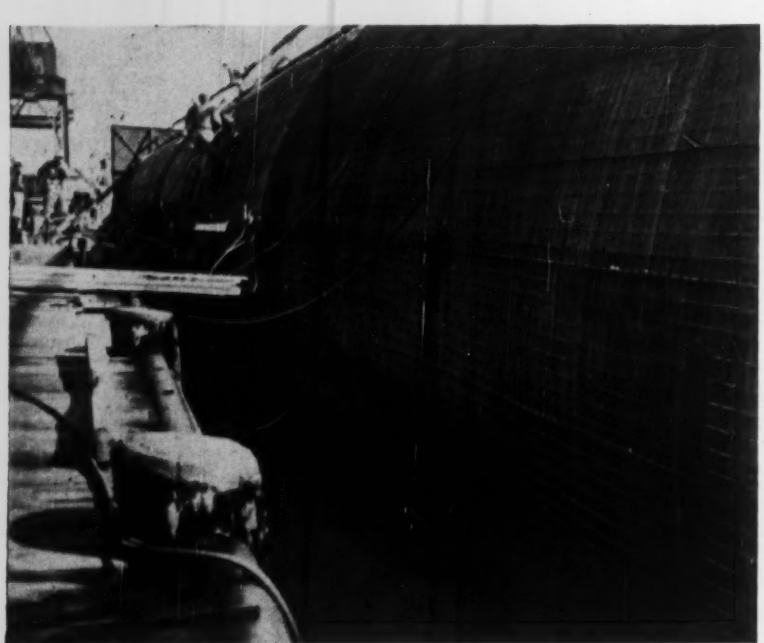


TUNNEL IS KEY LINK in route now under construction to provide through-traffic arteries for north-south and west-bound traffic. Circumferential route will serve local traffic, siphon off some incoming traffic from surrounding areas.

Quickest Way Through Baltimore:



OUTER SURFACE of ⅜ in. steel shell of tunnel section is covered with wire mesh and air-applied concrete to thickness of 2½ in.

Before very long, the best way for a motorist to get through Baltimore will be to drive right through the middle of it. This he'll be able to do quickly via a 15-mile expressway carved through the city's most congested waterfront and older residential districts, and through a 7,650 ft twin-tube (four-lane) vehicular tunnel under the Patapsco River—the whole route almost exactly bisecting the municipal area from northeast to southeast.

All seven parts, into which that route has been divided for construction purposes by the Maryland State Roads Commission, are under construction—notably the tunnel itself, which will be far and away the largest of its kind ever built. And the whole of the $130-million toll project is scheduled for completion by the end of 1957.

To add frosting on the cake for local traffic, parts of a $40-million circumferential "Beltway", which will connect with the two ends of the tunnel route to form a rough circle completely around the city (with a radius of about seven miles from the heart of

SHAPE-UP BASIN for the 300-ft long, twin tube sections of tunnel is on south shore of Patapsco River, where plant prepares tubes in stages for eventual towing to location and sinking. First tube section was sunk in place April 11.

Right Through the Middle

the downtown area) are already under contract. Other parts of the belt system aren't due to be finished until 1965.

• **Motorists' nightmare** — For more years than most Baltimoreans like to recall, the city has been a nightmare for motor traffic bound north or south along the eastern seaboard.

With its ancient mercantile and business heart thickly clustered around the many-armed Patapsco estuary, the city is a cat's-cradle of narrow streets threading through progressively more congested areas. Because its heart is the seaport area, and because it sits athwart the main travel routes to the north or south, Baltimore has been until recent years virtually impossible to bypass. And even a recently developed bypass—the Chesapeake Bay Bridge near Annapolis—entails a relatively long detour for coastwise vehicle traffic.

At present, despite the efforts of city authorities to provide one-way streets and through routes, travel time through the roughly 8 mi x 8 mi area of the city can take anywhere from 45 minutes to hours—depending on the hour a hapless driver hits the streets.

As a matter of fact, it now may take a truck anything from an hour upward to complete a six-mile trip around the harbor from a shipyard at Fairfield—at the south end of the tunnel—to a railroad yard at Canton on the north side.

• **Patapsco in the way**—The Patapsco is, for most of its length, a narrow stream, traversable by relatively small bridges. But it's mouth on Chesapeake Bay is a deep tidal estuary that has always been the city's heart. Around its three principal arms are studded railroad yards, industrial plants that depend on water-borne materials, shipyards, and cargo docks for all manner of ocean-going and coastwise shipping.

The flatness of the land around the estuary, and the extremely heavy marine traffic dictated a tunnel when it came time to plan for some better means of getting motor traffic through the city.

The Patapsco has some advantages for the tunnel-builder: It is an extremely traceable body of water—it has no perceptible current at all, and the tide variation from mean high to mean low water is only about 1.1 ft. Under the silt layer on the bottom lies a firm base of gravel and sand that will hold its shape when cut for a channel or a trench.

With this in mind, the commission and its consulting engineers went ahead with the design of a tunnel to be built by dredging an underwater trench, and sinking into it a series of prefabricated steel sections—in the manner that such tunnels have been built at least since 1925.

But there was to be a difference—this tunnel was to be longer than any other ever built by the method, and it was to carry four lanes of traffic—something no other such tunnel (except a short one in Holland) has ever been built to do.

• **Work starts**—The first construction contract—covering portal-to-portal sections of the twin tube itself—was let to Merritt-Chapman & Scott. This contract also included the fabrication of the tube sections themselves—work

Darex Diary

No. 10 of a series

by Henry L. Kennedy
Member, American Concrete Institute
Manager, Construction Products
Dewey and Almy Chemical Company

*"Hurricane-Tested" DARACONE

*New Uses for DARAWELD

WE HAVE always been proud of the excellent water repellency displayed by brick masonry after it has been properly treated with DARACONE. There are literally hundreds of installations that have attested to its premium performance. But I never expected to see the terrific forces of nature turned loose on a DARACONE-treated building such as was experienced in East Providence, Rhode Island, in the past two years.

Cabot, Cabot & Forbes built an office, warehouse and manufacturing plant for Dupont. As there was severe water penetration of the walls even during light rain storms, all the brick masonry was treated with DARACONE. Then along came Carol, the first of two severe hurricanes to strike the New England coast that year. Wind velocity reached 90 miles an hour — accompanied by torrential rains. Although the interior walls were inspected several times during the storm, they were dry. The DARACONE did what it was intended to do: it repelled the wind-driven water.

It wasn't too long before the building was again subjected to harsh treatment. Hurricane Edna — with 70 miles per hour winds — struck Rhode Island and deposited almost 6" of rainfall in three hours. Then during the summer of 1955, two more hurricanes—Connie and Diane — repeated the story, with the same high wind and terrific rainfall. In each case DARACONE's performance was the same: there was no masonry leakage.

To me, this is convincing evidence of the excellent job of water repellency that a premium silicone-base material like DARACONE can do for brick masonry.

I HAD an interesting talk the other day with one of our German consultants from Frankfurt, Germany. He told me about some of their interesting uses for DARAWELD. As an integral admixture for gypsum and lime plasters, it increases adhesion and improves the finishing properties. Because of the excellent water-resistance of DARAWELD, this use is particularly desirable in confined areas where warm, moist air or steam prevails. The amount they use is roughly 8 to 10 per cent of DARAWELD by weight of the plaster. When this amount is added, the internal cohesion of the plaster is much greater; also there is an improvement in the adhesion of the plaster to the brown or scratch coat. Water resistance of the plaster is improved, and bond of new plaster to old is substantially increased.

Here is another new application for DARAWELD. This same consultant told me that they quite often suffer excessive dusting due to the inadequate curing of concrete floors. Of course, we also have this situation in this country. They have used very successfully as a corrective, a one-coat application of DARAWELD which has been diluted one-part of DARAWELD to one-part of water. This means two gallons for one — a really economical coverage. We have tried several sections of our floors here at Cambridge, and it appears to be a good dust-preventive measure, resulting in a clean, dust-free floor at all times. After painting the DARAWELD on the floor, the surface takes on a slight sheen that is a decided improvement over the old surface. It was ready for foot-traffic in less than 48 hours.

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which was then sublet to New York Shipbuilding Corp. (for fabrication of nine sections), and to the Bethlehem Sparrows Point Shipyards (for 12 sections). Bethlehem further sublet the fabrication of four of its sections to the Maryland Shipbuilding & Drydock Co.

The steel tunnel sections consist of two tubes, each 300 ft long and either 32 ft 6 in. or 33 ft 2 in. in dia, held by steel collar plates and webs to form a tightly joined pair.

As in other tunnels of this type, the tubes are bulkheaded at the fabricating yard, launched, and floated to a "shape-up" pier near the site, where they are prepared for sinking.

To handle the job of preparing these great sections for their final place in the tunnel itself, MC&S took over a pier of the Patapsco Scrap Co., fully equipped with traveling cranes and other gear. With some 500 men on this job and on work in the river itself, MC&S can handle six of the double sections at a time in various stages of readiness.

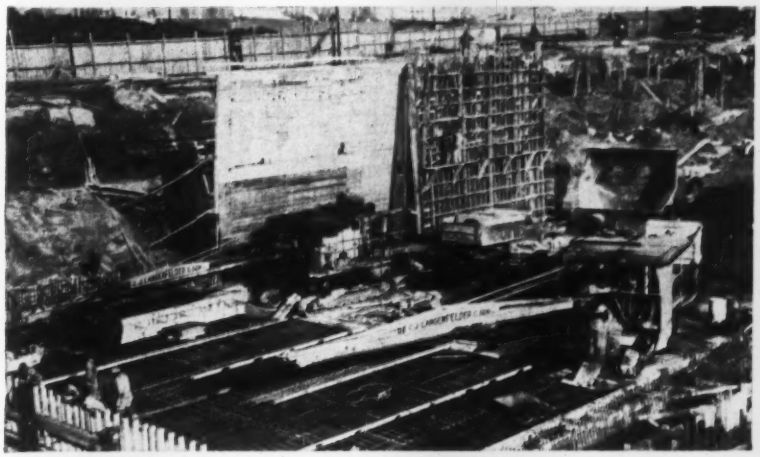
When launched at the shipyards, the sections already carry a 3-ft thick "keel" of reinforced concrete cast into the bottom of the sections between the bulkheads.

• **Shape-up**—At the shape-up pier, the contractor follows a carefully planned schedule of operations, placing interior concrete within the tubes in stages, including the slab to carry the 22-ft wide roadway. Then concrete is placed in the area between the two tubes, to sink the section into the water to a point where its freeboard is only a matter of inches.

Finally, towed by tugs, the tubes are moved out to exact locations in the river, and handled by floating cranes—four cranes to a section—until the last of the concrete has been added and the tube sunk into position. Underwater, the ends of the submerged sections are joined through collar plates that extend beyond the face of each bulkhead, and are connected by pins manipulated by divers. Then, curved sections of steel sheetpiling slide into slots in the bulkheads to close the spaces between the two tube sections, and tremie concrete is placed to complete the exterior seal.

Because of the lack of current in the Patapsco, engineers felt there was no need for the double shelled-tubes such as have been used at the Norfolk tunnel (ENR, Sep. 15, '55, p. 30). Instead, a steel wire mesh is placed over the outside of each tube, from the waterline up, and then the entire tube is encased in a 2½-in. pneumatically placed coat of concrete as protection for the ¾-in. steel plate that forms the shell of the tube.

APPROACH RAMP on south side of tunnel is cast in series of huge blocks, varying from 15 in. to 15 ft in thickness. Here bottom mat for blocks—6 in. thick—is in place, ready for waterproofing, build-up of reinforcing cage, and final concrete pour. Sidewalls in ramp section are cast independently.



CONTINUOUS POURS that have reached as much as 950 cu yd are handled easily with these two 34-E highway pavers, fed by trucks from nearby aggregate piles.

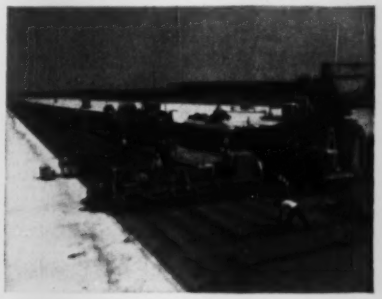
Placed by pumping from a 90-cu yd per hour batch plant at the shape-up pier, principal interior concrete is a reinforced lining 20 in. thick for the first 4,800 ft of the tunnel, and 24 in. thick for the last (northern) 1,500 ft where engineers estimated greater exterior loading requirements.

Also included in the MC&S contract are the ventilator shafts at the southern end of the tunnel where the ventilating building will be directly atop the portal; and at the northern (Canton) end. At the northern end, the shaft structure above the portal will only house huge ducts that will connect to a ventilating building offset 250 ft to the west of the roadway.

With seven of the big twin tubes now in various stages of readiness at the shapeup pier, water-borne equipment and crews of another subcontractor—the Arundel Corp. of Baltimore—under supervision of Grover C. Denny, are at work in midstream—paying due attention to the heavy shipping in the area.

The trench for the tunnel sections will be 70 ft wide at the bottom, where a 2-ft thick layer of clean sand will act as a bed for the tunnel sections. To provide sufficient clearance under a future 50 ft channel at midstream, the deepest portion of this trench will be 101 ft below mean water level. On the average, the top of the structure

Darex
products at work



DAREX AEA
used in huge concrete parking apron at Portsmouth Air Force Base

(Constructed for the U. S. Air Force by the New England Division of the Corps of Engineers, U. S. Army. Photo courtesy of "New England Construction.")

Imagine an air base parking apron that seems to extend as far as the eye can see! That's the impression you get when you view the huge 8,000 ft. x 1,000 ft. apron at the Portsmouth Air Force Base.

This parking apron must support huge B-47 planes with a swept-back wing span of 116 feet, a length of 107 feet, and a maximum take-off weight of 200,000 pounds. It is necessarily immense and of the heaviest construction.

The apron is surfaced with a 14-inch thick slab of air-entrained portland cement concrete, made with DAREX AEA. Air-entrained concrete made with DAREX AEA places easier, finishes faster and better, is many times more durable when exposed to freezing and thawing.

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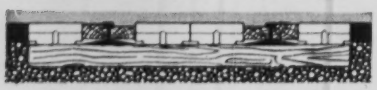

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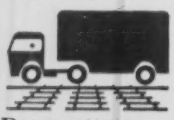

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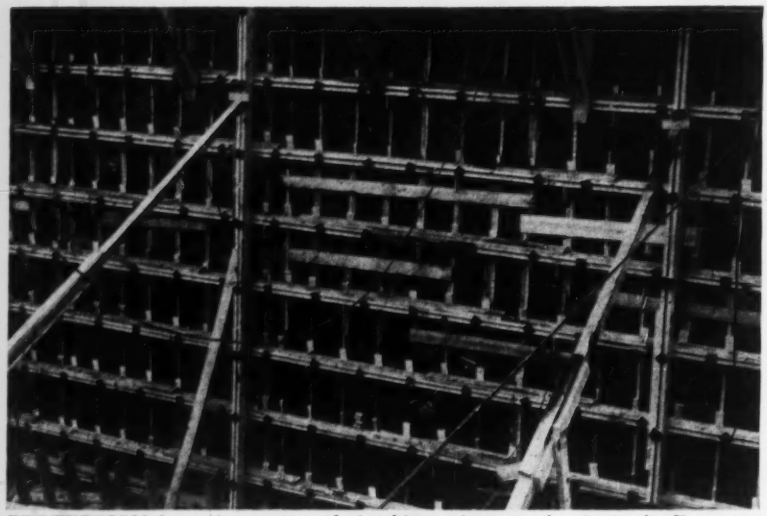
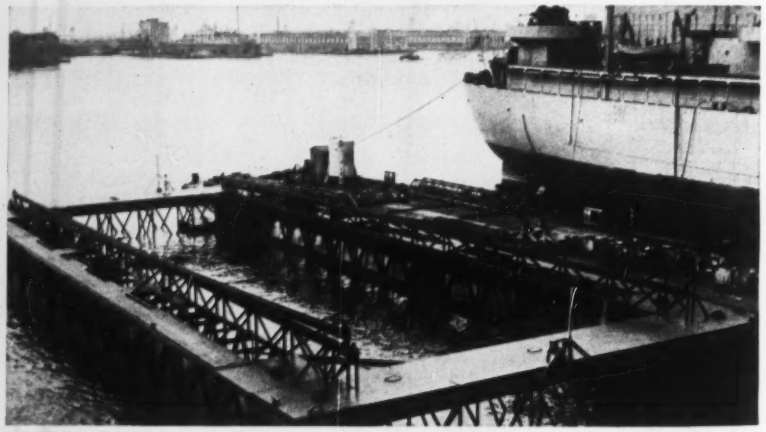


PROTECTION for curing concrete during bitter winter weather is simple: Forms are backed with standard wool insulation batts to retard loss of heat, eliminating need, says contractor, for heating or other usual devices, when masses are sufficiently heavy.



SCREED BARGE, specially built for job, consists of two hollow steel boxes that can be flooded to provide exact required elevation for screed. Tracks along inside faces give exact alignments for slope of trench. Barge is 192 ft long, 84 ft wide.

will be 57 ft below the existing level of the river bottom.

The sub-contractor is excavating the first 40 ft depth of the trench with a dipper dredge, and a clamshell to reach final depth. Once the tubes are placed, joined and unwatered, backfill of varying grades of granular material will cover them.

• **Shore work**—The 16 miles of approach expressways, connecting to the 1.7 miles of tunnel structure (including ramps) is divided into seven engineering design sections, each with a contracting engineer to do detailed design and construction supervision. Each of the approach expressway sections is being built by contractors varying from one to three contracts per section.

Biggest contractor on the approaches, in terms of number and value of contracts, is C. J. Langenfelder and Son Co. Inc., of Baltimore, which holds six contracts for approach work on both sides of the river, at a total bid price of more than $22 million.

One of these jobs is the 1¼-mi section on the south end of the job, running from the ventilator shaft at the tunnel portal to the ground level, about 1,280 ft southward.

Problem here is to cast large blocks of concrete to form the roadway base in single continuous pours. The roadway base will be a series of immense concrete "steps" varying from 15 in. to 15 ft in thickness, the full 44-ft roadway, plus 8-ft median strip in width, in bays roughly 40 ft long. Several of these blocks have required continuous pours of more than 950 cu yd.

The work is done after clamshells

BIG NEWS in road maintenance:

COLD APPLIED

BITUMULS®

Slurry Seal

Spreader-box application of Bitumuls Slurry is fast and easy.

BITUMULS SLURRY SEAL is a fast, simple, and highly effective technique for getting extra years of satisfactory service out of cracked, worn, or spalled pavements.

The slurry, itself, consists of a mixture of Bitumuls emulsified asphalt and water to which sand or crusher dust (or a combination of both) is added to form a free flowing mix.

Typical Slurry Preparation

On a typical successful operation, the Bitumuls emulsion and water were first fed into the drum of a transit mix truck. Then aggregate, conforming to the following gradation, was added slowly to assure complete coating:

Sieve Sizes	*Per cent Passing*
Number 20	100
" 30	91
" 50	54
" 100	20
" 200	5

Method Of Application

The slurry, delivered to the job in the transit mixer, was chuted into a spreader box, towed behind the mixer truck, onto the pre-watered pavement. (The spreader box was a rectangular, sled-like frame, one traffic lane in width. It was equipped with a rubber strike off, or squeegee blade, which assured even distribution and uniform coating, and forced the slurry into cracks and depressions.)

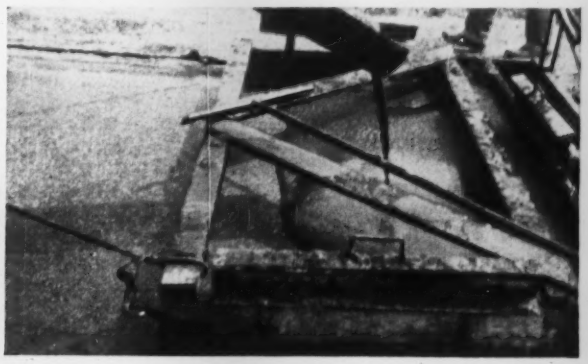
Pioneered In The West

Quickly and easily applied at exceptionally low costs, Bitumuls slurry sets rapidly and can usually be opened to traffic within two to three hours.

This method was pioneered by Los Angeles County forces. Working closely with them were Engineers of American Bitumuls & Asphalt Company.

Bitumuls Slurry Seal has been used effectively in both Southern and Northern California, and test sections have been placed in other areas of the country. The "big news" of this relatively new method of extending pavement surface life is spreading fast. Get full data from our nearest office.

Aggregate and Bitumuls are fed into transit mix truck, then water is added as required.



Close-up view of the specially-designed spreader-box.

Leading Marketers of Asphalts, Cutbacks, and Emulsions — Nationwide.

American Bitumuls & Asphalt Company

200 BUSH STREET, SAN FRANCISCO 20, CALIFORNIA • Perth Amboy, N. J. • Baltimore 3, Md.
Cincinnati 38, Ohio • Columbus 15, Ohio • Mobile, Ala. • Tucson, Ariz • Seattle, Wash.
Baton Rouge 2, La. • St. Louis 17, Mo. • Inglewood, Calif. • Oakland 1, Calif.
Portland 7, Ore. • Washington 5, D.C. • San Juan 23, P. R.

and buckets have dug out a trench to proper depth 42 ft below ground surface at the south portal, sloping upward on a 3% grade to ground level). Wellpoints were installed to keep the excavation dry—the layers of gravel and sand that make up the soil in the area being stable enough in most cases to hold slopes without further bracing. Some sheetpiling has been used, however, in areas where close cutting has been necessary.

An initial 6-in.-thick surface mat of concrete is first cast, and then a waterproof membrane and then bituminous waterproofing is mopped on. On top of this, a layer of brick is placed. Then the heavy reinforcing cage is constructed, and the final pour begins.

To get continuous pour in the confined area of the cut—and to take advantage of local sources of aggregate that permit short-haul material trucking, Langenfelder uses two standard 34-E road pavers, delivering aggregate and cement into the skips and delivering concrete directly into the form over as long a period as may be necessary to complete the block.

Sidewalls for the open cut section are cast separately atop reinforcing cages tied into the floor slab reinforcing. Forms up to 40 ft in height and 40 ft long slide into place for this work. To protect the considerable masses of concrete in these walls during bitterly cold winter weather, the contractor has backed his forms with ordinary rockwool insulation batts, eliminating need for tarpaulin, straw, or artificial heating provisions.

According to Frank Barnes, Langenfelder's project manager, the insulation has worked perfectly.

• **Cut and cover**—On the north end of the project, the under-river tunnel enters a cut-and-cover tunnel section that will carry the roadway 1,135 ft under a railroad freight yard, to a point where the roadway emerges into an open cut ramp and mounts again to ground level.

In the excavation for this section, and for the north-side ventilation building, offset from the tunnel right-of-way, the contractor experienced one small slide after a heavy rainfall and used some sheetpiling to protect foundation work. However, in general the silt-sand-gravel soil—like that on the south side of the job—holds itself very well without much help.

On this side, too, the roadway in the cut-and-cover section will be supported on cast-in-place concrete piles.

Like the under-river section itself, the tunnel approaches in both cut-and-cover and open ramp sections will be paved with brick.

Generally, work on both ends of the tunnel itself has been facilitated by careful selection of the site through an area where problems of maintaining surface traffic and underground utilities are at a minimum.

On the south end, the approach is through a narrow corridor that runs between a scrapyard and a huge lumber storage yard, but on comparatively clear right-of-way that required little in the way of demolition. One railroad spur crosses the corridor and must be maintained. On the north end the tunnel comes up in a freight yard of the Canton Railroad. One difficulty here, was relocation of a number of huge metal sulphuric acid storage tanks, property of a riverside chemical plant. Railroad tracks, also, have had to be relocated.

In other areas, considering the degree of congestion around almost any major population center, the right-of-way clearance problem is relatively free of real trouble.

At the moment, the entire route, from its junction on the north end with the Pulaski Highway (U.S. 40) to two arms feeding out of the toll plaza on the south is under contract.

In addition, a new engineering contract has just been awarded for work on an extension to the north—beyond the U.S. 40 intersection—that will eventually provide a connection to the proposed Northeastern Expressway, which would connect with Pennsylvania and Delaware highway systems.

Russell H. McCain is chairman of the Maryland State Roads Commission; Norman M. Pritchett is chief engineer and Walter C. Hopkins, deputy chief engineer, is serving as liaison engineer on the project. Bruce A. Herman is project manager for J. E. Greiner.

Listed below are "contracting engineers" for each section of the Baltimore Harbor Tunnel project, and holders of prime contracts in each section.

J. E. Greiner Co., Baltimore, consulting engineer to Maryland State Roads Commission, owner.

Section D 1

Green Associates, Inc., Baltimore
C. J. Langenfelder & Son Inc., Baltimore (2 contracts) $7,679,000

Section D-2A

Louis Berger Associates, East Orange, N. J.
Wright Contracting Co., Columbus, Ga $2,771,000
Buckley & Co. Inc., Philadelphia $3,751,000

Section D-2B

Clarkeson Engineering Co., Inc., Boston
Nello L. Teer Co., Durham, N. C. $3,020,000

Section D-3

Whitman, Requardt & Assoc., Baltimore
C. J. Langenfelder & Son Inc. (2 contracts) $7,881,000

Section D-4

Singstad & Baillie, New York City
C. J. Langenfelder $2,206,000
Merrit-Chapman & Scott, N. Y. $29,894,000
Joseph F. Hughes & Co., Inc., Baltimore $2,361,000
The Leo Butler Co., College Park, Md. $5,030,000
Nager Electric Co. & Keystone Engineering Co $2,245,000

Section D-5

Joseph K. Knoerle & Assoc., Inc., Baltimore
McLean Contracting Co., Baltimore (2 contracts) $6,615,000

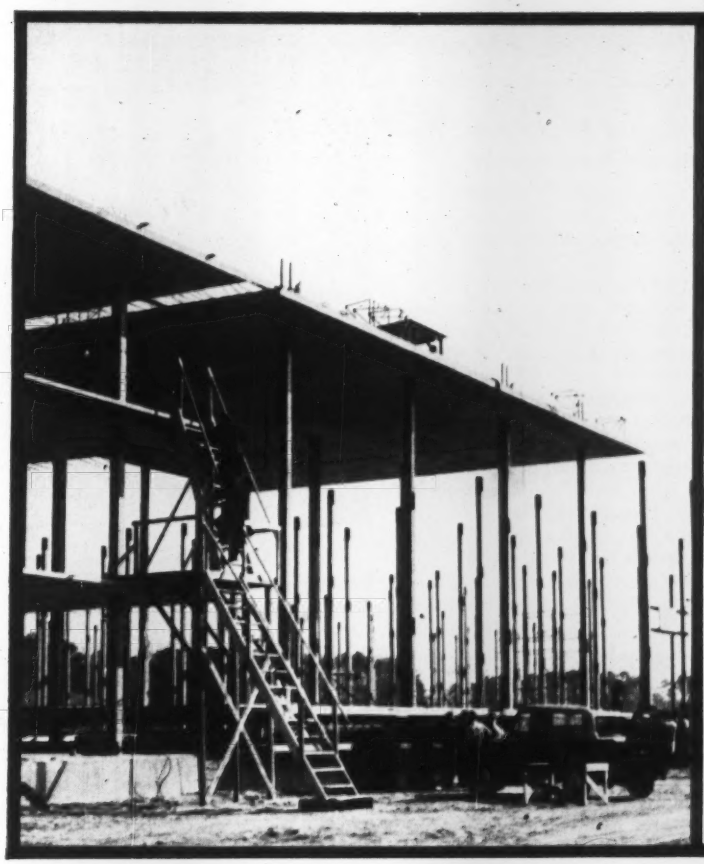
Section D-6

William H. McFarland, Binghamton, N. Y
C. J. Langenfelder $3,733,000
Square Construction Co., Baltimore $2,767,000
Wright Contracting Co $2,455,000

Section D-7

Rummel, Klepper & Kahl, Baltimore

Additionally, a contract for $954,534 has been awarded to the American Blower Corp., Detroit, for ventilating and blower equipment; and contracts are to be let shortly for toll booths, administration buildings, emergency service structures and the like.



Extra Value makes the difference in Contract Bonds

AN INDEMNITY BOND covered the contractor on this slab-floor dormitory built for U. S. Navy at Little Creek, Va.

INDEMNITY of North America is one of the leading independent markets for surety bonds. The extra value it gives is measured in . . . *Carrying capacity; Service* with agents and offices in principal cities of the free world; *Preferred rates* and *Prompt attention* for qualified contractors. For extra value in your bonding requirements see an INDEMNITY agent or your own broker.

One of the North America Companies which are headed by Insurance Company of North America, founded 1792

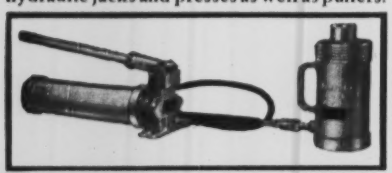
Protect what you have ©

INDEMNITY INSURANCE COMPANY OF
NORTH AMERICA
Philadelphia

Cables in concrete "I" beam are stressed to pre-determined tension by 60-ton Simplex "Jenny" Hydraulic Puller equipped with pressure indicating gauge.

Hydraulic Puller Prestresses Concrete Faster, Safer, Easier

"Center-Hole" pulling, an exclusive feature in Simplex Pullers, has simplified prestressing jobs, according to concrete construction men. The "Center-Hole" construction of the Puller, they explain, permits tensioning cables or rods to be drawn through the center of the tubular ram. This eliminates torque, dangerous off-center pressures and complicated back-up devices—actually makes pulling 75% easier. The Simplex "Jenny," illustrated above, is a self-contained unit which serves as its own back-up or can be used with a simple chair, reducing set-up time. Simplex "Center-Hole" Pullers are available in capacities from 30 to 100-tons and in self-contained or remote controlled units. They may also be used as powerful hydraulic jacks and presses as well as pullers.



SIMPLEX "RE-MO-TROL"—Remote-Controlled Unit has ram connected to hydraulic pump by high pressure hose for safe, convenient use in tight spots and dangerous locations. A pressure gauge may be installed for checking tensioning pressure.

FREE BULLETIN SHOWS HOW

Illustrates application of all models of Simplex Hydraulic "Jenny" and "Re-Mo-Trol" Pullers for prestressing concrete and for other construction uses. Write for copy of Hydraulic 53.

WORLD'S LARGEST MFGRS OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

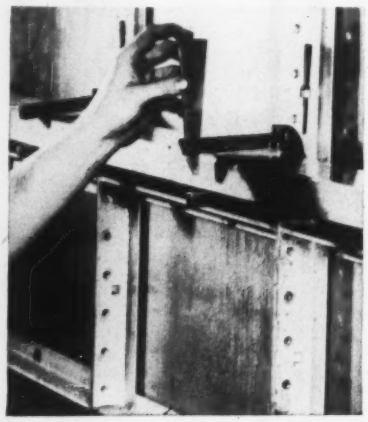
SIMPLEX JACKS

RE-MO-TROL JENNY UTIL-A-TOOL ROL-TOE

TEMPLETON, KENLY & CO. 2553 Gardner Road Broadview, Illinois

New Products

Clamps Speed Alignment Of Concrete Form Panels



Faster alignment of concrete form panels is claimed for Liner-Loc, a reusable alignment-lumber clamp introduced by Universal for use with the company's Uni-Form panels.

The C-shaped device can be fastened to the steel frame of a panel in a few seconds. The arms of the C project outward from the panel, but the upper arm pivots aside on a vertical hinge pin while the alignment lumber is being placed on the lower arm. Then with the upper arm swung outward again, a malleable iron wedge is tapped through the loops on the arm ends to tighten the aligning lumber against the form panels.

No wood wedges, nails or liner hooks are required. Elimination of nailing prolongs lumber life. Universal Form Clamp Co., 1238 N. Kostner Ave., Chicago 51, Ill.

Sandwich or Sheet Wall?—It's Either

Box-ribbed embossed siding, now offered in aluminum, may be used as either a single sheet siding or as the outside of a field-fabricated sandwich wall.

Advantages claimed by the manufacturer include low initial cost, light weight, speedy erection, and long service life with little maintenance.

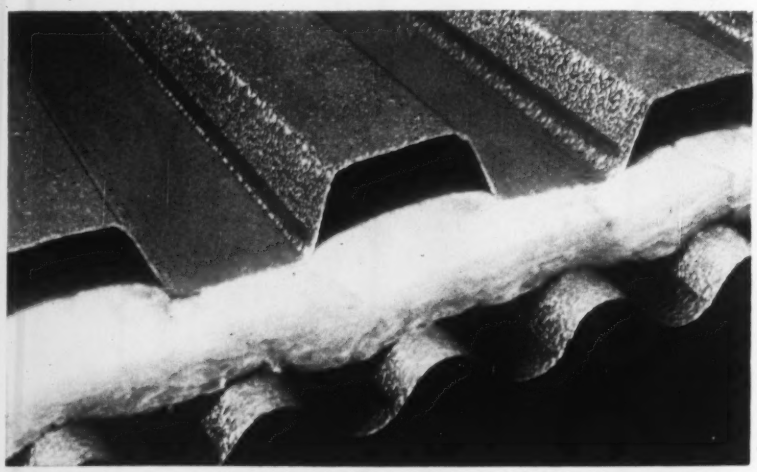
Sandwich walls with the new sheets may be constructed by first putting up an interior aluminum panel of 0.024 or 0.032-in. standard industrial corrugated siding. A layer of 1-in. glass fiber insulation is followed by the box-ribbed aluminum.

The completed sandwich panel is 3⅜ in. thick and has a heat transmission coefficient less than $U = 0.16$. Cost-in-place of the curtain wall is between $1.10 to $1.25 psf. It can be fastened with either welded studs or Z-bars and self-tapping screws.

The box-ribbed embossed siding is available in 0.032 ga, 34⅛ in. wide. This gives a net coverage of 32 in. with a one-rib side lap. Pitch of the ribs is 5.33 in., each rib having a 1½-in. depth. Sheets weigh 0.63 lb per sq ft and come in half-foot increments, in length from 5 ft to 12 ft.

Interior sheets are available in all standard lengths and widths, in 0.024 or 0.032 ga, plain or embossed. Also available are extruded aluminum Z-bars for mounting, 1x1x¾x⅛ in. Kaiser Aluminum & Chemical Corporation, Kaiser Building, 1924 Broadway, Oakland 12, Calif.

(*New Products continued on page 69*)



WICKWIRE ROPE DISTRIBUTORS WEAR MANY HATS

Wickwire Rope distributors are men who wear many hats. They are at home in the headgear typical of the numerous and varied industries they serve—the marine and fishing trades, the oil fields, construction, logging and many other industries having specialized wire rope needs.

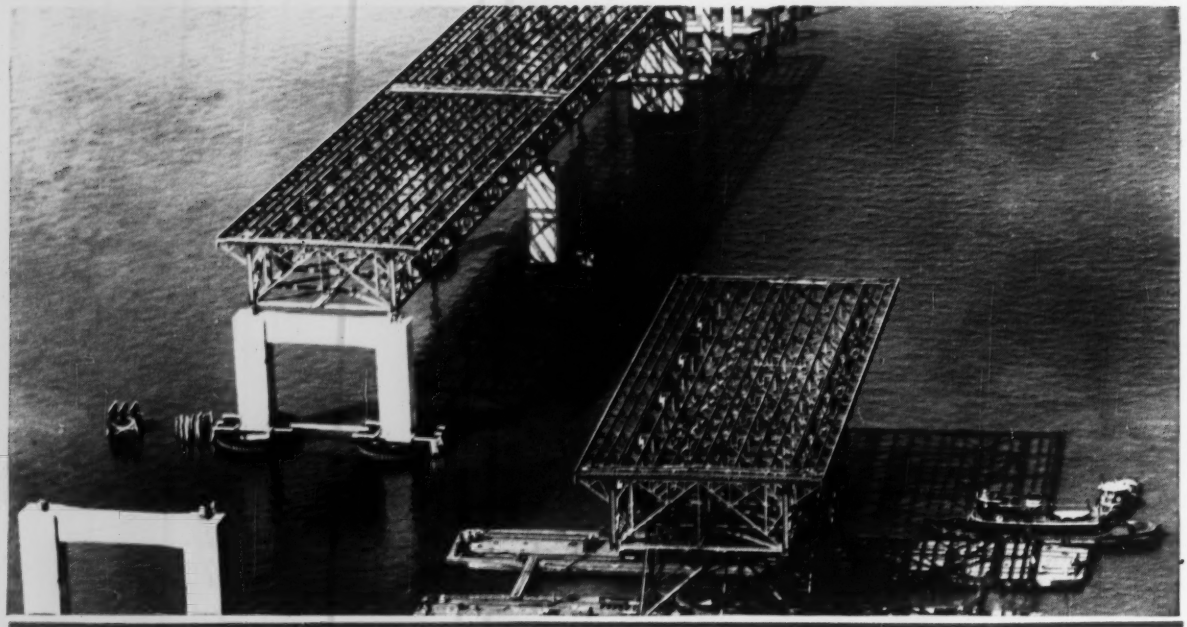
These men aren't hat models—they can wear these hats because of their long experience in the industries they serve. Add to this their intimate knowledge of local conditions and their comprehensive Wickwire Rope stocks, and you'll see that your Wickwire Rope distributor is the man who can be of great help to you.

Yes, your Wickwire Rope distributor is a good man to know. He's quality people handling quality products. Buy your wire rope and wire rope slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3154



Two-way protection for $60,000,000 Hudson River Bridge with Pittsburgh's X-L-O STRUCTURAL STEEL PRIMER

1 Safeguards steel shapes against corrosion during shipment and erection

2 Provides excellent foundation coat for field painting

ONE OF THE important links of the New York-Buffalo New York State Thruway is the $60-million Hudson River Bridge between Tarrytown and South Nyack, N.Y., which is to be ready for use later this year. This important portion of this new highway comprises nineteen 250-foot units, such as those shown above, and a 1,212-foot main span and 602-foot side spans for a main-channel cantilever bridge. Spans for this bridge are being fabricated and erected by the American Bridge Division, United States Steel Company.

Structural shapes for this great new viaduct are being safeguarded against corrosion during transit and erection with Pittsburgh's new X-L-O Primer. This unusual product also reduces risk of surface failures that necessitate premature cleaning and painting. New X-L-O Primer also serves as an excellent foundation for final coats. It is available in combination of red lead and iron oxide, or can be supplied with 100% red lead if desired. You can get IRONHIDE or METALHIDE top coats in a range of colors suitable for field painting. For additional information write, phone or wire Pittsburgh Plate Glass Company, Industrial Sales Division, Pittsburgh, Pa., or the factory nearest you.

PITTSBURGH PLATE GLASS CO.; Industrial Paint Division, Pittsburgh, Pa. Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Atlanta, Ga.; Houston, Texas; Torrance, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Michigan. Thresher Paint & Varnish Division, Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Division, Pittsburgh, Pa.

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PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

Retractable Scarifier Made For Caterpillar Models

Designed especially for Caterpillar Traxcavator Models 977, 955 and 933, a retractable hydraulic scarifier is now in production.

A rigid single-unit assembly, including drawbar and cylinder support bolts, provides extra strength and easier installation. Two cylinders raise and lower the frame, which accommodates up to five curved scarifier shanks—shank connections being pinned and either locked or hinged depending on the work ahead. AMERICAN TRACTOR EQUIPMENT CORP., 9131 SAN LEANDRO BLVD., OAKLAND 3, CALIF.

Increase Horsepower Ratings In New Crawler Tractor Line

Incorporating a number of new engineering features, International Harvester announces the introduction of a new crawler tractor line, comprised of four models—the TD-18, TD-14, TD-9 and TD-6.

Principal engineering changes, according to the company's announcements, are: substantially increased horsepower ratings in the first three machines; better operator visibility; cerametallic clutch facings; pressurized cooling systems; 500-hour track roller seals; and all weather, positive conversion systems which are standard on TD-18 and TD-6 models. The new clutch facing is composed of heat-resisting material similar to that used as brake linings on jet aircraft.

As an example of the new ratings, the TD-6 crawler is now rated at 41.5 hp; the TD-9 is now being produced with a 54.5 hp drawbar rating; the TD-14 is increased to 78.5 hp drawbar rating. INTERNATIONAL HARVESTER CO., 180 N. MICHIGAN AVE., CHICAGO 1, ILL.

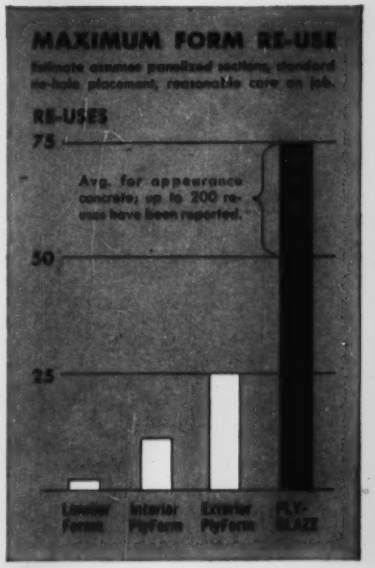
Torque Converter Featured In New Tandem Roller Line

Huber-Warco Co. has announced a new line of medium and large sized variable weight tandem rollers that features a torque converter and two-speed transmission as standard equipment. All four models—in the medium-sized 5-8 and 8-10 rollers and the large 8-12 ton and 10-14 ton tandems—are identical in their design features.

The manufacturer claims that on all four machines the torque converter more than doubles the available power and supplies it instantly when needed. Other improvements claimed for the unit include a decrease in fuel consumption, longer engine life; forward-reverse clutches; elimination of shock loads, stalling,

"Road Show" for Diesel Servicemen

In order to get latest service information on its machines directly to men in the field, the Cummins Engine Co. has built a mobile "school" that is expected to contact some 10,000 service men within the next twelve months. The mobile unit is self contained. It has its own stage, lights, chairs, public address system, demonstration models and the like. The unit is transported on an International Model CO 205 tractor powered by a 175 hp Cummins JT-6-B turbodiesel. The body is lowered and raised by three built-in hydraulic jacks—the body being lowered to a point ten inches above the ground before being opened. After a demonstration, the body is raised, the tractor backed under it, and then, cradled in a special mounting, is ready to move again. Setting up time is said to be about 50 minutes. Cummins Engine Co., Inc., Columbus, Ind.



50 to 75 is a good average, but with care you can get up to...

200 RE-USES with PLYGLAZE®

CONCRETE FORM PANELS

PLYGLAZE'S tough, hard surface stands up indefinitely under repeated concrete pourings. PlyGlaze forms are worn out only when the panels are cut into unserviceably small pieces. With proper design and care you should get 50 to 75 re-uses. Actually, *over* 200 have been obtained—even then PlyGlaze continues to form good-looking concrete.

TREE LIFE FOREST PRODUCTS
Another member of the famous Tree Life Family of Forest Products
Hard, glossy-smooth wear resistant fused resin-fiber surfaces.
Top-quality Exterior plywood (EXT-DFPA). Standard panel sizes.

ST. PAUL & TACOMA LUMBER CO.
Dept. ENR, Tacoma 2, Wash.
Please send free PlyGlaze literature.

Name .....

Address .....

City ..... Zone ..... State .....

ENGINEERING REPORTS:

PLEASANT, ATTRACTIVE non-glare tunnel lighting is supplied by G-E fluorescent lamps providing continuous lines of light. Varying-intensity system supplies more or less light as needed at portals to avoid light-blindness. System also allows quick relamping.

DRIVER SAFETY and comfort are promoted, yet power conserved by variable light levels achieved with G-E saturable reactors.

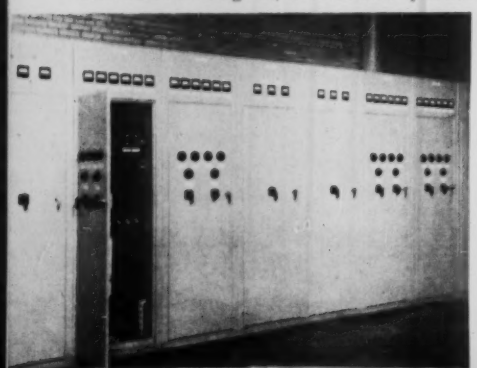
GENERAL ELECTRIC SYSTEMS . . .

Help assure traffic safety

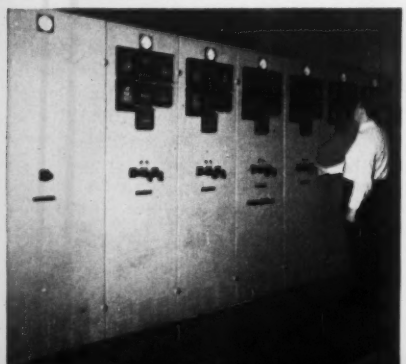
RELIABILITY AND SAFETY AT LOW COST describe the main requirements of a vehicular tunnel's electrical system. And to overcome any psychological aversion to tunnel travel, these systems must provide lighting designed to give an attractive, inviting impression. General Electric, long the largest supplier of electric equipment for tunnels, has had much experience providing such desirable systems. G-E systems have proved themselves at many of the major tunnels throughout the nation.

Feature of G-E system is continuous-line-of-light, variable-intensity lighting.* Intermittent shadow and glare areas are practically eliminated and tunnel is given cheerful appearance. Eye adaptation, day or night, at entrances is eased by adjustable light levels at portals.

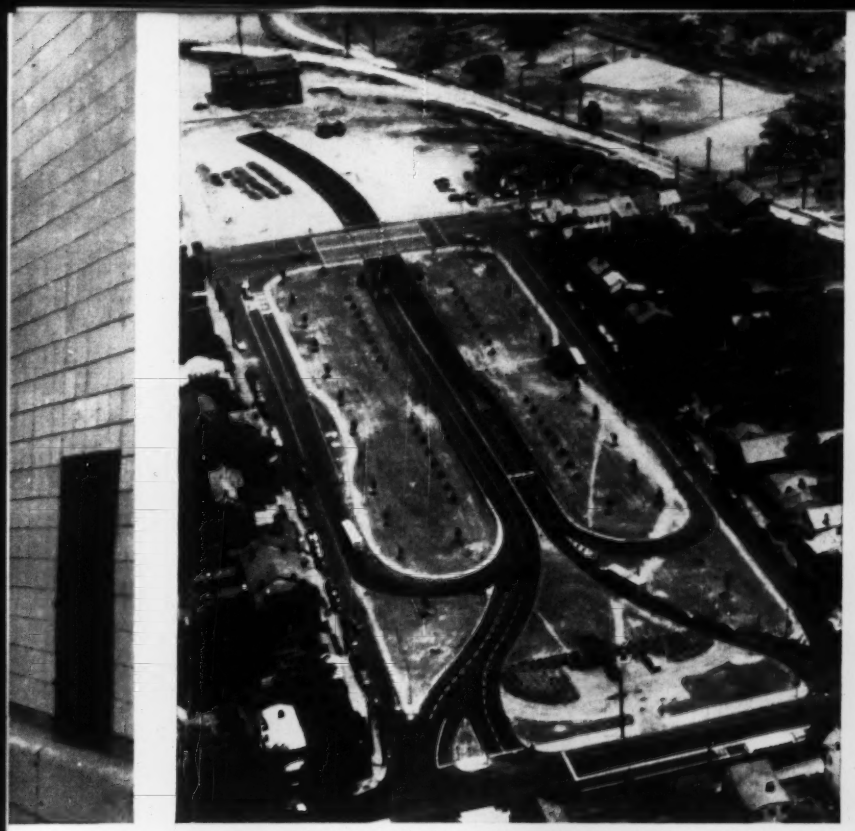
INTEGRATED CONTROL of light levels for varying-intensity system is accomplished with custom-designed, G-E control panels.



VITAL CONTINUITY of power system is provided for by highly dependable G-E metal-clad switchgear at service entrance.



ECONOMICAL G-E unit substations supply power close to load, protect and control tunnel feeder circuits.



NORFOLK-PORTSMOUTH Tunnel in Virginia is one of several major tunnels in the U.S. that features a G-E electrical system. Built under the Elizabeth River, the tunnel is 3350 feet long and has clover-leaf approaches (above).

SQUIRREL HILL Tunnel on Penn-Lincoln Parkway, Pittsburgh, also incorporates major G-E equipment in vital light and power system.

BROOKLYN-BATTERY Tunnel in New York City, also equipped by G.E., is longest in U.S. (9117 ft). G-E luminaires such as those shown here help assure safe, well-lighted approaches.

'and make tunnels more attractive

VALUABLE ENGINEERING SERVICES are also available to you with G-E equipment for tunnels. Application engineers, who are experienced specialists in tunnel systems, assist consultants and equipment manufacturers in system design and equipment selection. Field service engineers help contractors expedite installation, start-up. Nationwide service shops mean maintenance and repair facilities are never far away. Project co-ordination helps assure integrated on-time engineering, shipment, and installation, of your equipment.

Bring your electrification problems to G.E. Whether your next project is a tunnel or any other heavy construction activity, contact your G-E Apparatus Sales Representative early in the planning stages so he may put G-E equipment and services to work for you. General Electric Company, Section 664-40, Schenectady, N. Y.

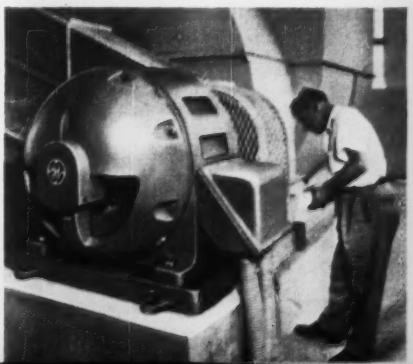
*System first developed by consulting engineers L. Geenens and O. Singstad.
†Reg. Trade-mark General Electric Company.

Engineered Electrical System for Heavy Construction

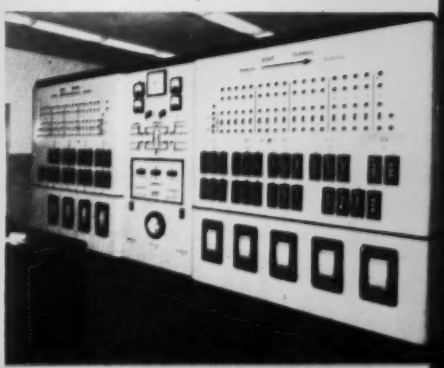
GENERAL ELECTRIC

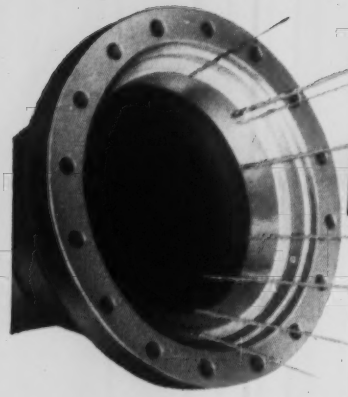
FACTORY-ENGINEERED, Cabinetrol† panels provide accurate, co-ordinated control of tunnel fan motors.

STURDY G-E Tri-Clad† induction motors drive ventilation fans. Multi-speed feature saves power during off-peak traffic periods.



CENTRALIZED control of tunnel system and services is offered by compact, fully co-ordinated G-E duplex switchboards.





RIVERS? Nothing to 'em!

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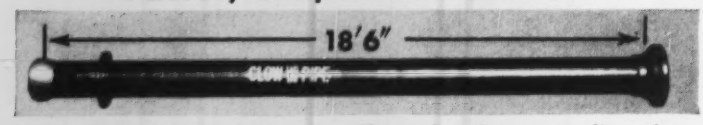
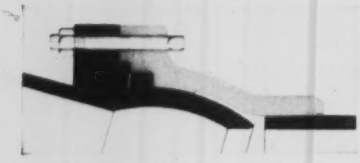
CLOW CAST IRON
Ball-and-Socket
RIVER-CROSSING PIPE

Faster, Simpler Installation



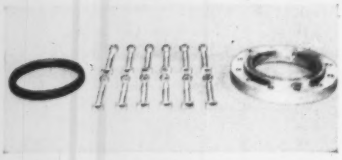
Longer laying lengths, fewer joints. Shorter lengths to exact dimension.

Full Flow at Full Deflection

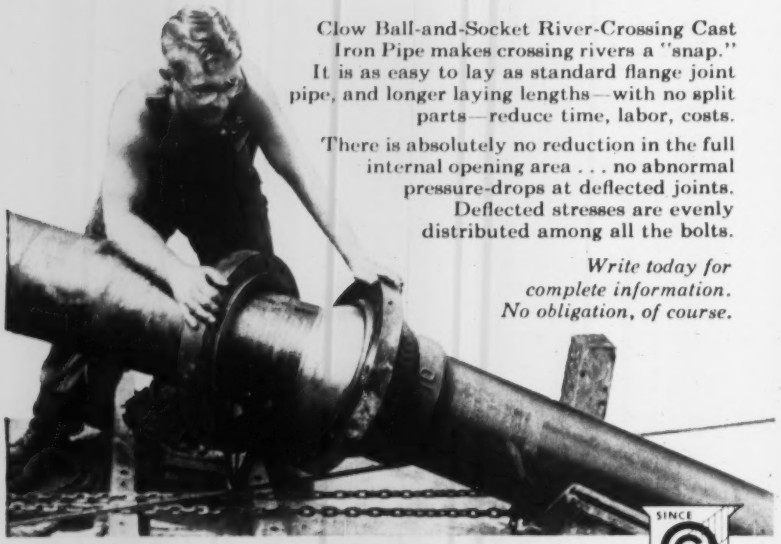


Full 15° turning deflection. No restriction of the waterway.

Fewer Parts No Split Parts



Needs only a ratchet wrench for fast, firm assembly.



Clow Ball-and-Socket River-Crossing Cast Iron Pipe makes crossing rivers a "snap." It is as easy to lay as standard flange joint pipe, and longer laying lengths—with no split parts—reduce time, labor, costs.

There is absolutely no reduction in the full internal opening area . . . no abnormal pressure-drops at deflected joints. Deflected stresses are evenly distributed among all the bolts.

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overloading, and the need for a master clutch. Through use of a tail shaft governor, the roller will closely maintain the speed set by the operator automatically, regardless of the grade encountered. Huber-Warco Co., Marion, Ohio.

Treatment Process Allows Multiple Re-Use of Forms

Development of a new protective finish for plywood forms used in masonry construction is said to permit multiple re-use of forms after only one application. Up to 12 uses of the plywood have been reported without re-finishing.

Called Form Saver, the new finish is described by its manufacturer as a blend of synthetic resins in fast-evaporating solvents. It is free of grease, wax, oil, shellac or varnish. It is claimed that this formula permits clean, smooth stripping of the forms with no pitting of the concrete surface—or transference of the raised grain from the forms to the masonry. The formula is brushed on, or may be applied by dipping if enough forms are involved. L. Sonneborn Sons, Inc., New York City.

Lightweight Power Saw

Developed especially for small land clearing or brush cutting is the new 5 hp, 19 lb direct drive Model EZ power saw.

The manufacturer says the light saw will cut through an 8 in. oak in five seconds; and an 18 in. pine tree in 14 seconds, and can be used to bring down trees up to 3 ft in dia. The unit includes an integral cooling fan; waterproof and dustproof ignition; and die cast magnesium and aluminum alloys for maximum strength with light weight. Homelite, 75 Riverdale Ave., Port Chester, N. Y.

Deck Paint Cuts Skid Risk

An anti-slip floor and deck paint will now be marketed after passing 15 months of test use on refinery catwalks, oil-loading platforms, tanker decks, tug and barge walkways, and refrigerator car floors.

Incorporating a relatively soft, nonmetallic, sparkproof and anti-slip agent—in either light gray or maroon enamel—the coating is designed to reduce hazards where oil, grease or water cause slippery surfaces. The manufacturer recommends two-coat application, by either spray or brush. E. I. du Pont de Nemours & Co., Wilmington, Del.

Here's the Inside Story of Why You Get Lasting Accuracy, Eliminate Costly Repairs with . . .

Brunson's Patented

DUSTPROOF BALL BEARING CONSTRUCTION!

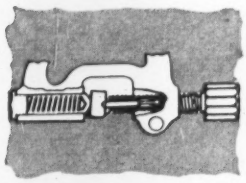
Engineer's Transit Model 50

Think surveying instruments are all pretty much alike? The "inside story" shows you why Brunson instruments are different—why they assure lasting accuracy and minimum maintenance unrivalled by any other instruments. The big difference is dustproof ball bearing construction!

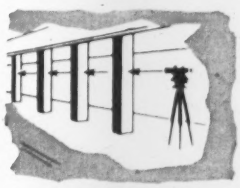
Located in the spindle and telescope axis, Brunson ball bearings are permanently lubricated by an all-temperature grease and sealed against dust and moisture. Preloaded and accurate to 5-millionths of an inch, these ball bearings provide highest possible instrument accuracy. With dust sealed out and lubricant sealed in, wear is practically eliminated by the smooth ball bearing action. That's why your Brunson instrument stays accurate and operable year-in-and-year-out, where others fail. You save hundreds of hours in on-work time, avoid costly errors, slash routine repair and maintenance expense to a level undreamed of in the past.

You pay no more for Brunson's exclusive ball bearing construction. Mail coupon today for the complete "inside story".

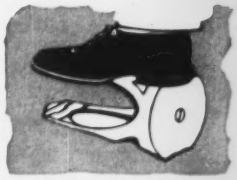
You Get These Big Advantages, Too!



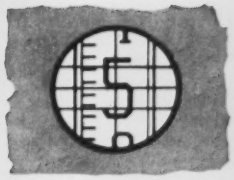
Wobble Pin in Tangent Screw Point—Enables your Brunson instrument to stay "on point" by eliminating strain and wear points that cause slippage.



Long and Short Shots in Collimation—Long and short shots are all in exactly the same straight line. No attachments needed for sharp focus at even 42 inches.



Sturdy, Heat Treated Cast Truss Standard—Supports over 200 pounds without bending or warping. Strong construction, throughout, withstands even the roughest handling.



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Publications

Tandem rollers—Complete specifications for the Model KX-25E Roller are contained in 12-page bulletin S-71-1255, "3-Axle Walking Beam Tandem Rollers." The company's "walking-beam compaction control" is illustrated. BUFFALO-SPRINGFIELD ROLLER CO., SPRINGFIELD, OHIO.

Aggregate data—The Aggregate Producers Handbook, a new 124-page book contains quick-reference information on aggregates and aggregate production machinery including engineering data, table, charts—all assembled from authoritative sources. SMITH ENGINEERING WORKS, MILWAUKEE 1, WIS.

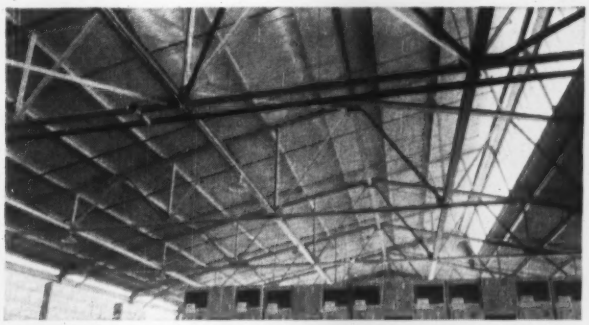
Insulation protection—The uses of Laykold Weathercoat as a protective coating on many types of thermal insulation are described in an 8-page illustrated booklet. The impervious membrane coating is shown being trowel-applied to structures, and spray-applied to the compacted base material of sloping reservoir walls. AMERICAN BITUMULS & ASPHALT CO., 200 BUSH STREET, SAN FRANCISCO.

Drilling manual—A 35-page booklet, "Basic Procedures of Diamond and Shot Core Drilling," is illustrated with drawing and photographs. The text is written in nontechnical language and represents research and compliation of operational data on both diamond and shot core drilling. Price is $1.00. ACKER DRILL CO., INC., 725 W. LACKAWANNA AVE., SCRANTON 3, PA.

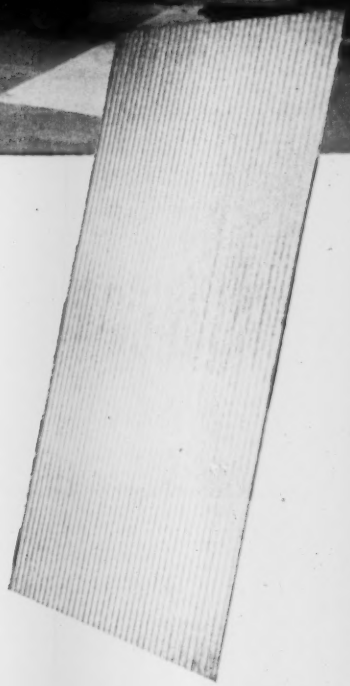
Protective fabrics—Herculite, a comparatively new protective fabric, is described in a brochure now available. The material is a laboratory-developed combination of nylon and special plastics that is claimed to be tear-proof, weather-proof, resistant to combustion and is unaffected by grease and other common corrosives. HERCULITE PROTECTIVE FABRICS, INC., BELLEVILLE, N. J.

Cleaning tool—The Clemco Educt-O-Matic, said by its manufacturer to be the first completely self-contained abrasive cleaning tool, is described in a four-page brochure. Light weight permits operation in such tight places as inside tanks, on ceilings, floors, cleaning before and after weld. A patented feature is complete recovery of abrasive and dust. CLEMENTINA, LTD., 2277 JERROLD AVE., SAN FRANCISCO.

This Purex warehouse, made of Kaiser Aluminum, was designed by Dave R. Edwards Co. and erected by Columbia Structural Steel Co. Highly corrosion-resistant, it will never need painting or protective finish of any kind.



The entire warehouse is illuminated by natural light coming in through the monitor in the roof and reflected by the aluminum ceiling and walls. Note that overhead lighting is not being used.



PUREX

Purex Corporation cuts costs with warehouse made of Kaiser Aluminum

"Kaiser Aluminum Roofing helped cut costs on our new warehouse," says Al Stoneman, Executive Vice President, Purex Corporation, Ltd., Los Angeles. "The corrugated aluminum resists corrosion so well that we don't need paint or other protective finishes, even though we are located in an industrial area where refinishing of other building materials is frequently required. Building maintenance costs are very low."

Not only does Kaiser Aluminum Industrial Roofing and Siding provide greater protection and lower maintenance . . . it also assures *immediate savings.* Its light weight reduces transportation and handling costs. And it often requires lighter, less expensive supporting structures.

Whatever you're building—think of Kaiser Aluminum—for better value at lower cost! For A.I.A. File and complete information, contact any Kaiser Aluminum sales office listed in your telephone directory. Or write Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois; *Executive Office,* Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

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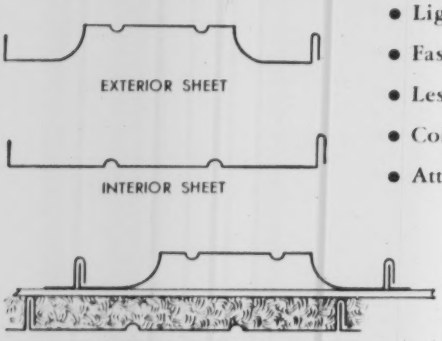
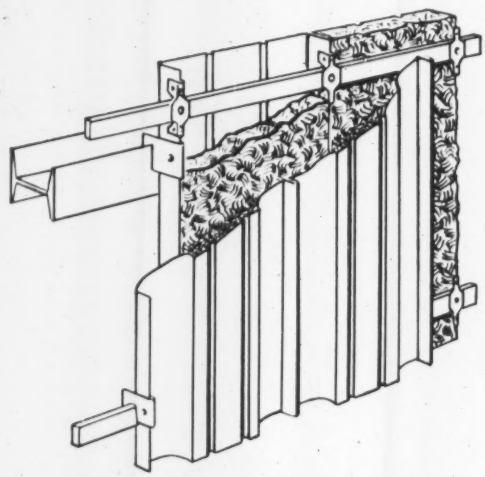
STRAN-STEEL CURTAIN WALL

Now your buildings can have structural soundness as well as a fresh, attractive appearance with Stran-Steel curtain walls. Exclusive *Stran-Satin* finish gives you a satin-smooth, highly decorative surface and the added protection of a non-corrosive zinc coating. And, of course, the eye appeal of these *Stran-Satin* panels is combined with the low cost and extra strength that only steel can offer. For wall or fascia construction in all types of public buildings, specify Stran-Steel curtain wall.

Stran-Steel curtain wall panels offer these advantages . . .



- Light framework
- Fast, easy to assemble
- Less heat loss
- Complete wall insulation
- Attractive appearance



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San Francisco 5, Calif., 215 Market St.
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"Rapid Without Name"

They may be running out of names at the sites, but The Shawinigan Water and Power Company is still finding sites for hydroelectric development along the Upper St. Maurice River in Quebec. Work crews are already in the area, and construction is about to start on a 246,200-kw development at Rapide Sans Nom, shown on the map in relation to other Shawinigan installations.

Consider Expansion Program For Roads in West Germany

A ten-year plan for expansion of highways estimated to cost $1.4 billion is under discussion by the West German Federal Government.

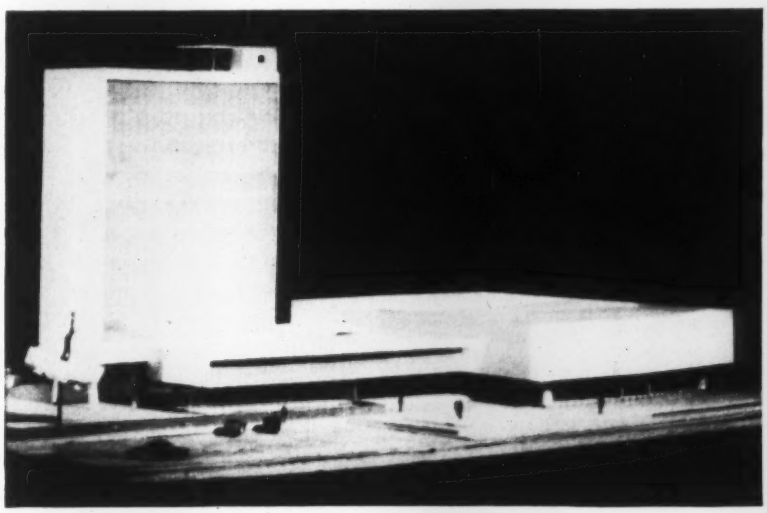
The plan provides for reconstruction of 10,750 km of existing road; building 960 km of new highways; improvement of roads through towns; 1,390 km of new autobahns.

Federal Transport Minister Fritz Seebohm does not believe the German capital market could supply the total needed funds but hopes to raise the money on a yearly basis by an increase of 15% in road taxes paid by car owners or another increase in the mineral oil tax. He suggested also that part of the program be financed out of rearmament funds.

Highway Bridge to Be Built Across Canada's Peace River

The Alberta Department of Highways will construct a highway bridge across the Peace River at Dunvegan.

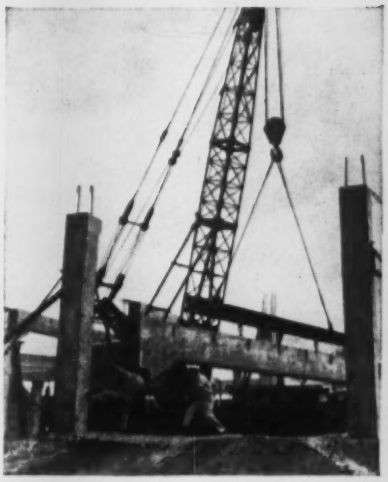
The structure, one of 25 bridge projects planned for the province in



Sandwich Walls Go South of the Border

Six hundred porcelain-enamel sandwich panels will form the exterior of the City of Panama's new Legislative Palace. Manufactured in the U. S., the panels are colored green and vary in size from 42 x 23 in. to 42 x 46 in. Each consists of a 16-ga exterior porcelain-enameled steel face laminated to a 1-in. cane-fiber insulating core, with a galvanized steel pan-shaped backing. Architect for the Republic of Panama's new building is Ernesto de la Guardia 3rd. General contractors are Construcciones y Proveedoras Unidas. Architect and builder are both of Panama. Seaporcel Metals, Inc., Long Island City, N. Y., is manufacturer of the panels.

Pre-cast



Secured by four 1¼" Richmond Screw Anchors, this 25 ton girder is lifted into place in first fully pre-cast, prefabricated building in the New England area, designed by Universal Engineering Corporation and built by the David Nassif Company, both of Boston. Placement of the 8-ton column on the left was accomplished with one 1¼" Richmond Screw Anchor imbedded vertically in the column head. Casting of all the pieces necessary for the complete construction of the 51,000 square foot building through production-line assembly of pre-cast walls, panels, girders and beams took only six weeks. In all concrete construction work, Richmond equipment guarantees speed and safety.

All segments of the building, like this 12 ton panel held in secure check by 4-1¼" and 4-¾" Richmond Spider Anchors for lifting and bracing, were cast flat and swung into position by means of frames or I-beams attached to Richmond Anchors which had been cast into the concrete panels. Richmond anchorages with their established safe load strength and absolute reliability are a natural for all such prefabricated concrete assemblies.

For more information and your copy of Richmond's 1955 Catalogue showing the complete line of Richmond products applicable to all types of concrete construction, write: RICHMOND SCREW ANCHOR COMPANY, INC., 816 Liberty Ave., Brooklyn 8, N. Y. or 315 South 4th St., St. Joseph, Mo.

Never before— a roof deck finish like this!

NOW — Bonderized base with baked enamel on Milcor Steel Roof Deck — a roof deck prime coat that can really take construction abuse.

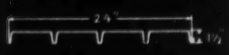
Here is important news to everyone in the building industry. It is the full and complete answer to problems which have long been evident to architects and builders — problems arising from the punishment taken by roof deck in shipping, handling, hoisting and use as a platform by tradesmen.

Milcor Steel Roof Deck is the only one in the field with this new, exclusive, far superior primer.

Bonderizing and baked enamel combine to produce the new glossy grey finish. The Bonderizing treatment defies corrosion, anchors paint to the metal, protects it against scuffs and scratches. The abrasion-resistant enamel is *baked on* over the Bonderized steel. The result is the finest, most durable finish ever applied to steel roof deck — and there is no increase in price!

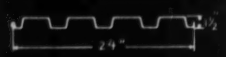
Milcor Steel Roof Deck with the new primer is described in detail in literature just off the press. Send for your copy.

NOW . . . three different types of Milcor Steel Roof Decks



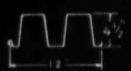
New "A" Section

The standard of the industry for closed-rib decks now redesigned to full 24" width.



New "B" Section

Wide rib distributes metal for greater structural efficiency — gives higher section properties per pound of steel.

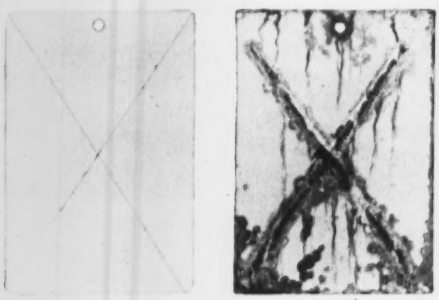


New "C" Section

Carries normal roof loads over spans up to 20 feet! Offers freedom of design.

MILCOR® Steel Roof Deck

The steel panel at left was treated with Bonderite, the one at the right was not. Both panels were given a coat of Inland Epoxy Resin primer. After an "X" was intentionally scratched on them, the panels were subjected to the A.S.T.M. standard salt spray test for the same length of time. Note that in the finish over Bonderite, rust stopped at the scratch mark while it spread extensively over the plain steel panel.



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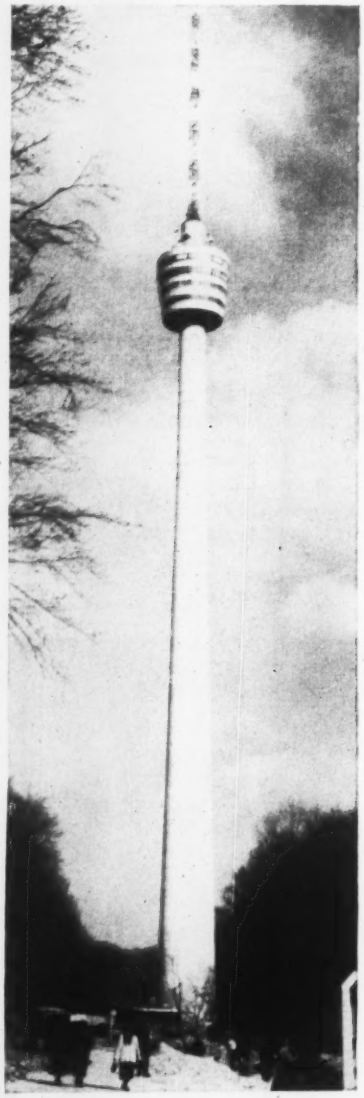
1956, will not be completed for several years. The site is a difficult one, with very high banks at a point where the stream is 2,000 ft wide. High clearance will be required because of river ice problems.



Eiffel Tower Competitor

Completed after eighteen months of construction, this new TV tower in Stuttgart, Germany is reported to be Europe's second highest structure. The tower (ENR Sept. 29, p. 282) measures 692 ft to the tip of its steel mast, as against Europe's ranking 984-ft Eiffel Tower.

Overlooking Stuttgart from a 1,600-ft-high hill, the tower features a turret atop a 446-ft-high tapered concrete cylinder.

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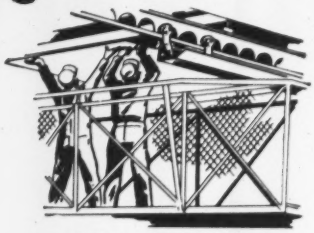
Tramrail CUTS Bridge Building Costs

1. SAVES
Construction Time

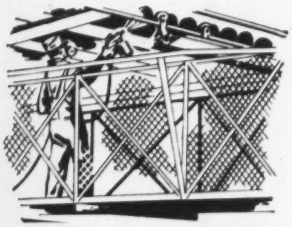
2. SPEEDS
Inspection and Painting

3. SIMPLIFIES
Maintenance

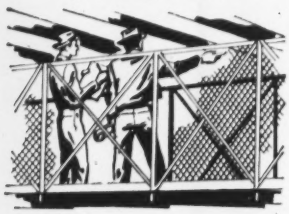
Dalles Bridge over Columbia River between Washington and Oregon. Equipped with a Cleveland Tramrail System including six traveling service platforms operating between piers. The platforms are 36'-6" long and extend beyond the bridge sides.



CUTS concrete form erection time.



SAVES many hours of painting time.



MAKES bridge inspection a simple, easy job.

A CLEVELAND Tramrail Bridge Servicing System can effect such large savings in bridge construction that no bridge builder can afford to overlook this latest development.

The Tramrail installation on the Dalles Bridge over the Columbia River is a good example of this. The equipment was included in the original design. By erecting it in the early stages of construction, the bridge builder was able to pay himself a handsome "bonus" resulting from the efficiency that it brought about.

The equipment made possible savings in several ways. It drastically reduced man-hours required for setting bridge deck forms prior to pouring the concrete. It speeded assembly of many structural members. It simplified placing of electric conduits. It aided bridge inspection and saved a large amount of painting time.

The Tramrail continues to be an important cost-reducing and safety factor now that the bridge is completed. Periodical inspections can be made easily and quickly. Any maintenance underneath can readily be taken care of. Painting and sandblast equipment can be stored on the service platform, making the work easier and, of course, less costly.

Cleveland Tramrail engineers in the principal cities in the U.S.A. and Canada stand ready to serve you.

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OVERHEAD MATERIALS HANDLING EQUIPMENT

Men and Jobs

Wade Taylor Promoted To Reclamation Post

Secretary of Interior Douglas McKay has named Wade Taylor regional director of the Bureau of Reclamation's Region 3, with headquarters in Boulder City, Nev.

Taylor, a career engineer who has been with the bureau for over 21 years, has been acting regional director in Boulder City since the death of J. P. Jones last December.

After receiving his masters degree in 1935 from the University of Colorado, Taylor worked briefly for the W. A. Betchel Company at Denver before joining the bureau as junior engineer in Denver. He was transferred to Boulder City as assistant regional power manager in 1945.

W. Demarest Joins NAHB As an Assistant Director

William Demarest of Washington, D. C. has joined the National Association of Home Builders as an assistant director of the Construction Department and Research Institute.

Formerly serving as modular coordinator in the national headquarters of the American Institute of Architects, Demarest has been working with the Producers Council and NAHB on standardization of construction measurements in the planning of new buildings.

He was previously associated with the New York architectural firm of Harrison and Abramovitz.

Highway Department May Train Engineering Aides

A special training course for a group of "engineering aides" is being considered by the South Carolina Highway Department in an effort to overcome what chief highway commissioner Claude R. McMillan terms a critical shortage of engineering personnel for an expanding highway program.

If the plan goes through, graduates of the course would be used in starting engineering job classifications that do not require graduate engineers.

According to McMillan, the training period would cover a period of eight weeks and would consist of classroom, office and field training in various semi-professional engineering jobs.

Minimum requirements would be a high school diploma, satisfactory completion of a course in mechanical drawing and satisfactory military status. Those subject to call to active military service and those planning to enter college in the fall would not be considered.

Unit Masonry Association Names MacTaggart Chairman

Robert MacTaggart of Vancouver, B.C., has been named chairman of the Unit Masonry Association, a joint British Columbia union-management group formed to encourage the use of masonry products in construction.

Objects of the group are to focus attention of the general public, architects and structural engineers on the advantages of masonry products in construction and to encourage the development training programs for apprentices.

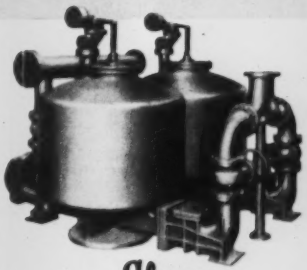
The association is comprised of members of Local 1 of the Bricklayers and Masons Union; masonry contractors; clay products, concrete products and mortar manufacturers; and dealers and suppliers of masonry products.

(Men & Jobs continued on page 82)

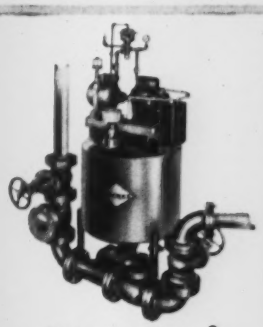
Burtt Made Vice President

Thomas W. Burtt has been appointed vice president in charge of Engineering and Construction of Holmes & Narver, Inc., Los Angeles engineers and contractors. He was associated with Standard Oil of California for 25 years, handling engineering and construction, both domestic and foreign. In 1952 he joined Holmes & Narver, Inc., where he became director of Engineering and later a member of the board of directors.

YEOMANS OFFERS THE MOST COMPLETE LINE OF PNEUMATIC EJECTORS



THE Shone®



THE PACKEX®

. . for handling domestic wastes of apartments, offices, hotels, hospitals, clubs, and other buildings

Whatever your requirements, there's a Yeomans Pneumatic Ejector specially suited for your job. More than 100 sizes are available in three basic types . . the Shone . . the Expelsor . . and the Packex. And there's a price range for every pneumatic ejector application.

Yeomans Pneumatic Ejectors are efficient for low gallonages, and handle solids easily. They're completely sanitary and odorless, and are built ruggedly . . to outlast the building itself.

Ask for free literature on Yeomans Pneumatic Ejectors. Catalog 4304 describes the electrode-controlled SHONE . . 4005, the mechanically controlled SHONE . . 4407, the EXPELSOR . . 4420, the PACKEX.

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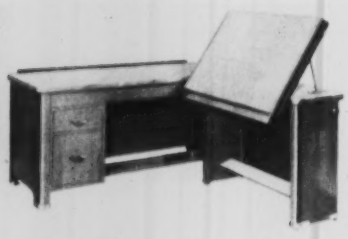
DRAFTING TRENDS

New "L" angle drafting table saves motion

A new drafting table may change the working habits of many draftsmen within the next 12 months. After years of experimentation, the new table has gone into production at the Hamilton Manufacturing Company and will be distributed by Post.

Designed as an "L", the steel table has a complete reference area at a right angle to the drawing board (see photo). Unlike many table arrangements in which the draftsman must turn around completely, or leave his board altogether, the new table consolidates the entire working area—the reference desk is never more than a slight turn from the board. This arrangement conserves a surprising amount of time and motion.



Reference desk is 28" x 60" and contains 3 drawers. The board itself is 26" x 40".

Like Hamilton's *Auto-Shift* table, the new "L" table adjusts easily and quickly. A hand trip permits slope adjustments to any angle from vertical to horizontal. Another release frees the board for height adjustment through a range of 8". These convenient adjustments are easy to operate and step up efficiency. Many executives have reported substantial production increases using this type of adjustment ■

Another motion-saver: "Boardmaster" drafting machine

While very helpful on the board, many drafting machines have characteristics which almost nullify their value—blind spots, awkwardly placed controls, slippage in control settings, etc.

The Universal "Boardmaster" drafting machine solves many of these problems. Its overarm construction allows complete visibility of the protractor at all times. The controls are all *centrally located*—conveniently placed for manipulation by two fingers.

The indexing control has a push-button action that provides automatic indexing every 15°. The vernier clamp has an ingenious double wing lever for locking intermediate angle settings.

Aside from operating ease, the "Boardmaster" meets the highest standards for accuracy. We believe it to be the finest drafting machine available.

Further information on these items is available from the Reader Service Division of Frederick Post Company, 3651 N. Avondale Avenue, Chicago 18.

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ENGINEERING EQUIPMENT & DRAFTING SUPPLIES • FIELD EQUIPMENT & DRAFTING FURNITURE

. . . Men and Jobs

Contractor Group Starts Two Specialty Chapters

The Building Contractors Association of California has formed two more specialty chapters within its framework, one for subcontractors and the other for commercial-industrial builders.

Formation of the subdivisions, now five in number, has stemmed from the growth of specialization within the industry and the need for additional forums for discussions of mutual problems. Members of the specialty chapters also belong to BCA's area chapters.

Other specialty chapters of BCA—one of the largest regional contractor associations in the country—include the Builder-Developer Chapter for tract builders, the Modernization Chapter for remodelling contractors, and the Associates for manufacturers of construction industry products.

Anderson-Nichols Names O. Imer Chief Engineer

Octave W. Imer has been appointed chief structural engineer at Anderson-Nichols and Co. consulting engineers, Boston, Mass.

Imer will head the firm's structural engineering department, which has been expanded to meet the demands of government contract work—work which included the Texas Towers, part of the radar network of the Air Defense Command.

A graduate of the Swiss Federal Institute of Technology, Zurich, Switzerland, Imer has supervised the design of such structures as the Riverside Baptist Church in New York, the cantilever bridge spanning the Mississippi at Cairo, Ill. and the Bonneville Administration Building at Portland, Oregon. He is a member of the International Association for Bridge and Structural Engineering and the American Concrete Institute.

Men and Jobs Briefs . . .

• **Careers**—The Delaware State Highway Department appoints **William J. Miller, Jr.**, formerly head of the traffic and planning division, as deputy chief engineer . . . **Otto H. Fritzsche**, a 31-year veteran with the New Jersey State Highway Department is named State Highway Engineer.

The Bureau of Reclamation appoints three construction engineers to California projects posts: **Louis B. Ackerman** for Trinity River Develop-

IGAS® JOINT SEALER

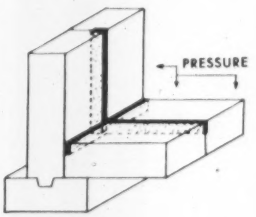
the non-meltable mastic waterstop

for joints in concrete, metal and other construction materials

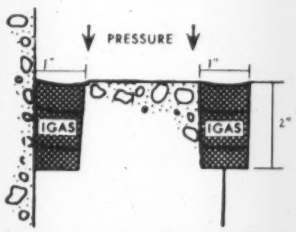
Igas Joint Sealer is a tough, resilient, non-meltable mastic installed after concrete hardens — simply and easily. Igas does not dry out or become brittle with age. It is easily installed in vertical, horizontal and overhead joints, and forms a continuous watertight seal, even at the junctions of joints. Igas is effective at temperatures from −10° F. to 180° F. (special grades for other temperature ranges).

2 basic designs solve most joint problems

TYPE A—Face Pressure

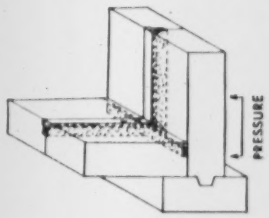


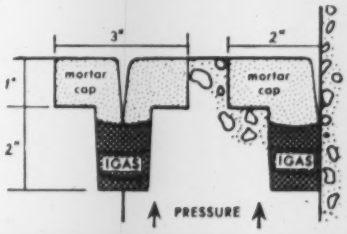
Water Reservoirs
Swimming Pools
Tanks
Parking Decks



TYPE B—Back Pressure

Basements
Tunnels
Retaining Walls





Joint sizes and types shown here are suitable for most jobs. Type A joints will sustain a 20 foot head of water with movement in the joint of 1/8". Type B joints will sustain a 20 foot head of water with movement in the joint of 1/16". Other joint details are available for special problems involving greater movement and greater water pressure.

Write or call today for full recommendations, specifications, and architectural details. There is no obligation, of course.

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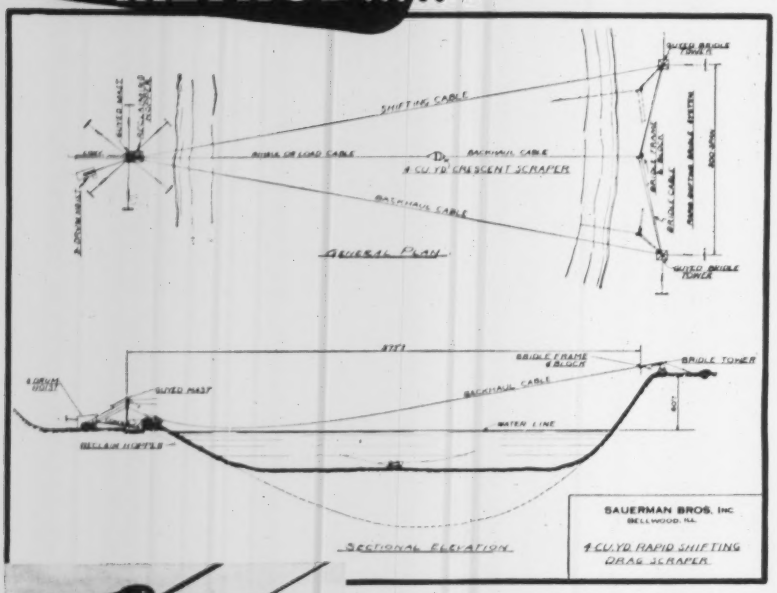
the SAUERMAN METHOD.....

Scraper Machines Engineered to Your Operation



Above drawing was prepared for a specific drag scraper installation and does not represent maximum spans.

View shows rapid shifting bridle frame and all operating cables. Crescent may be seen in background conveying load to reclaiming hopper just in front of mast.

•

Contact Sauerman's engineering department for specific recommendations and information. No obligation.

Ask for Catalog A, Drag Scrapers—24 pages of job photos and specifications. Request Field Reports showing your material being handled by the low cost Sauerman Method.

The Sauerman Method works equally well over widely differing areas and span limits . . . on hills, swampy ground or underwater . . . handles any material a dragline can dig.

Every scraper machine is powered by a Sauerman Roller Bearing Hoist, especially designed to withstand sudden shocks and changes in speed.

When a rapid shifter is used, a third hoist drum is added to shift the bridle frame. The rapid-shifting bridle system (upper right of drawing) permits frequent shifting of the scraper's line of operation in non-caving material, shallow excavations or overburden.

Operating costs are lower—basically, it is cheaper to drag material than it is to lift and transport it. You eliminate the power costs of moving heavy machinery about the area. You pay only for pay loads—not dead weight. When expendable parts—sheaves, clutch or brake linings—are replaced, the machine is restored to practically new condition.

Sauerman can help you select the method of materials handling most profitable for your job—a system that will give you the lowest cost per cu. yd. handled.

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. . . Men and Jobs

ment, **G. Raymond Rolin** for the Ventura project and **John R. Lawrence** for the Santa Maria project.

• **Business**—Coverdale & Colpitts, consulting engineers located in New York, names **Edward L. Wempie** a partner in the firm . . . Kreisler-Borg Construction Company, general contractors of White Plains, N. Y., promotes **Thomas J. Grasso** to vice president-general superintendent . . . **Walter Arch** is named chief engineer for the Gilbane Building Company, contractors in Providence, R. I.

• **Retirements**—**J. Trueman Thompson** as chairman of the Department of Civil Engineering at John Hopkins University, where he will continue to serve fulltime as professor in the department . . . **Albert T. Goldbeck,** engineering director of the National Crushed Stone Assn. for the past 30 years.

Obituaries

Lloyd Ross, 67, city engineer at Charlotte, N. C., from 1935 to 1949, died March 29. He received his civil engineering degree from the University of North Carolina in 1908. During his career in North Carolina he served as resident engineer with the State Highway Department, city engineer for Gastonia, engineer for Gaston and Mecklenburg Counties, and assistant city engineer at Charlotte. Since 1951 he had been with the Charlotte Lumber & Manufacturing Co.

William I. Collyer, 69, retired Commissioner of Public Works, White Plains, N. Y., died March 27. He joined the department in 1916 as a civil engineer.

David M. Phelps, 60, first chief engineer of rural highways in Kentucky, died March 26. A civil engineering graduate of the University of Kentucky, he was president of Phelps Engineering Co. and Phelps Blueprinting Co. at the time of his death.

John W. Gunn, 86, retired civil engineer, died March 25 in Lexington, Ky. In 1890 he received the first civil engineering degree awarded by the University of Kentucky.

Eugene H. Uhler, 71, retired professor of civil engineering at Lehigh University, died March 20 in Pennsylvania. Since his retirement in 1947, Uhler had been a consultant.

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96" FULL COMFORT CAB

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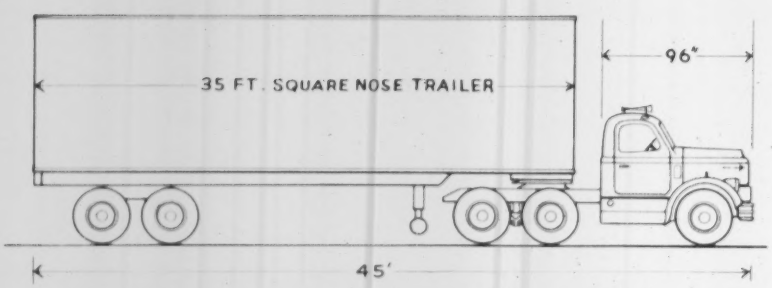
All the rugged engineering features of the *world's toughest trucks* plus exceptional maneuverability and roomy driver comfort of full-size conventional cab. *96" cab tractor pulls modern high-capacity square-nose trailers within 45' overall.* Tandem and single axles. All standard wheelbases for straight truck and truck-trailer uses, on or off highway. Models up to 48,000 G.V.W. or 62,000 G.C.W.

Reo A Series also in Gas or LPG Gold Comet short-stroke, wet-sleeve V-8s, 195—220 h.p.



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Tandem and single axles. All standard wheelbases for straight truck and truck-trailer uses, on or off highway. Models up to 48,000 G.V.W. or 62,000 G.C.W.

Reo F Series also available with Gas or LPG Gold Comet Engines—short-stroke, wet-sleeve *sixes*—from 107 to 160 h.p.

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SUBSIDIARY OF BOHN ALUMINUM AND BRASS CORPORATION

WORLD'S TOUGHEST TRUCK

Sulfite Wastes

New process will make feed from spent liquors

A new and potentially profitable method of treating sulfite waste liquors from wood pulp and paper mill wastes, was revealed at the annual meeting of the National Council for Stream Improvement of the pulp and paper industry, held at New York in February.

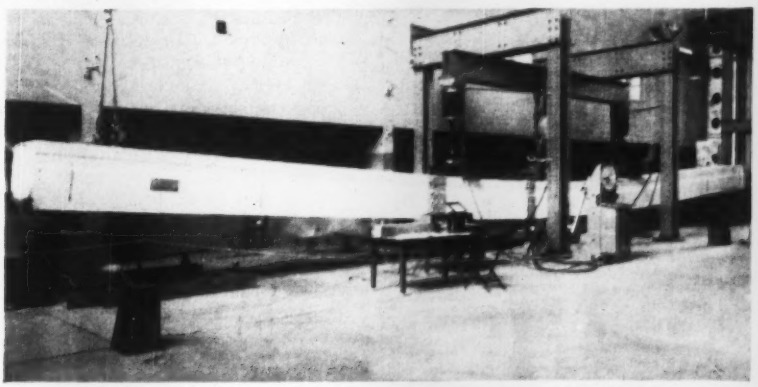
Herman R. Amberg, project leader of a research project at Oregon State College sponsored by the National Council, described preliminary results of experiments to produce a marketable animal feed, high in protein value, from spent sulfite liquors having unusually high concentrations of solids and biochemical oxygen demand. Both Amberg and Harry W. Gehm, technical advisor of the National Council, emphasized that much additional work was necessary before the new process can be proved practical and workable. Patents have been applied for.

The product, containing about 70% protein, is high in all the essential vitamins and amino acids, and animal feeding tests conducted to date appear encouraging. If this material can be produced at low cost, it would find a ready market in the Northwest, where practically all such feed supplements are imported to the area at a substantial freight cost.

The new treatment is an aerobic fermentation process involving diffusion of air. It can handle sulfite liquors plus a large portion of pulp wash water. The process enhances production of bacterial cells by concentration of cellular material during fermentation to between 1 and 1½% solids. This mixture thickens well, to between 4 and 5% solids. Further concentration is accomplished by centrifuging or vacuum filtration.

In another paper presented at the meeting, Herbert F. Berger, NCSI project leader at Virginia Polytechnic Institute, summarized trends in the application of biological treatment to pulp and paper mill wastes. Berger reported that biological filtration of mill wastes appeared to be only an academic subject at this time. However, there is a noteworthy trend toward the use of oxidation ponds to perform the role of expensive-to-construct aeration tanks.

These ponds are shallow, averaging



Pretensioned Beam Is Hard to Break

A 70-ft prestressed, pretensioned bridge beam—said to be the longest of its type—has shown amazingly high reserve strength. Loaded at its third points in tests at Lehigh University, the 33-in.-deep hollow rectangular beam carried nearly five times its design live load at failure.

Designed for H20-S16 live load (plus impact), the beam has overall dimensions of 36 x 33 in. Hollow space is 23 x 27 in. and runs throughout, except for diaphragms at ends and center of the beam.

For prestressing, 46 steel strands were each pretensioned to a force of about 12,000 lb.

Purpose of the tests was to determine the behavior of a beam under static loading, and results were favorable. At high loads the crack pattern was well distributed and cracks closed completely upon release of the load.

The beam was manufactured by Concrete Products Company of America at Pottstown, Pa.

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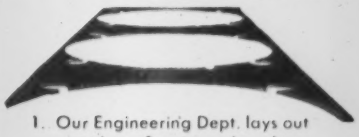

1. Our Engineering Dept. lays out complete flooring plan from your floor plan, sketch or overall dimensions.
2. A shop drawing showing layout of sizes, shape and cut-outs for obstructions is submitted for approval before fabrication.

3. Each panel is carefully checked by our inspectors before shipment and is clearly marked for quick installation.
4. We furnish erection drawings showing location of marked panels.

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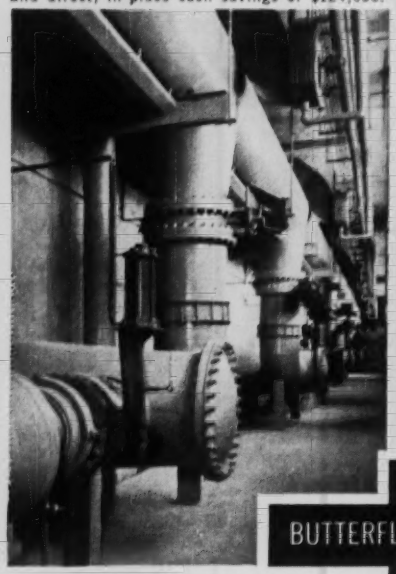

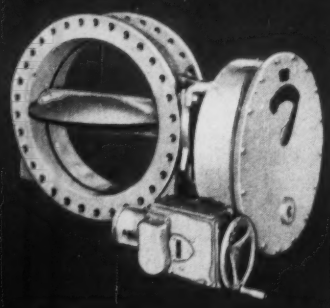

FOR HIGH-PRESSURE SERVICE SMS Babbit-Seated Butterfly Valves are built to give tight shutoff and meet the rugged demands of high-pressure service. They are available for shutoff pressures up to 200 psig, and for a wide range of velocities, including open-end free discharge.

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GET POSITIVE SHUTOFF, CUT CONSTRUCTION COSTS

For high or low-pressure water service, SMS has the Butterfly Valve to give you tight shutoff and help reduce construction costs. Using SMS or R-S Butterfly Valves in place of conventional gate valves permits a much more compact piping layout, means substantial savings in the initial building costs. For full information on the complete SMS valve line — Butterfly Valves, Ball Valves and Rotovalves —see our local representative or write S. Morgan Smith Co., York, Pa.

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CONTROLLABLE-PITCH SHIP PROPELLERS

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AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED • TORONTO

five feet in depth, and depend on the natural forces of sun, wind and temperature to oxidize mill wastes. Detention periods varying around twenty days are maintained. Solids must be removed from mill wastes before introduction into oxidation ponds.

Mills fortunate in having sufficient land are expected to make ever-increasing use of oxidation ponds, particularly in the South where temperature conditions allow a highly efficient oxidation process throughout most of the year. Little biological action is observed in water below 40 F.

ASTM Studies Radioactivity, Proposes Fly-Ash Standard

Among activities reported by the American Society for Testing Materials following its Committee Week meetings held in Buffalo last month:

• Use of fly ash with lime will be covered by a new specification, subject to ballot by Committee C-7 on Lime.

• A proposed test method for certain water-soluble chlorides in graded-aggregate road mixes will be put to letter ballot by Committee D-4 on Road and Paving Materials.

• Radioisotope analysis of industrial water and waste water is under study by Committee D-19 on Industrial Water. This committee is also working on methods for measuring radioactivity in water and performance tests for ion-exchange resins.

• A proposed test method for defining noncombustibility will be published in the ASTM Bulletin in the hope of stirring up more comments to help Committee E-5 on Fire Tests of Materials and Construction develop a standard.

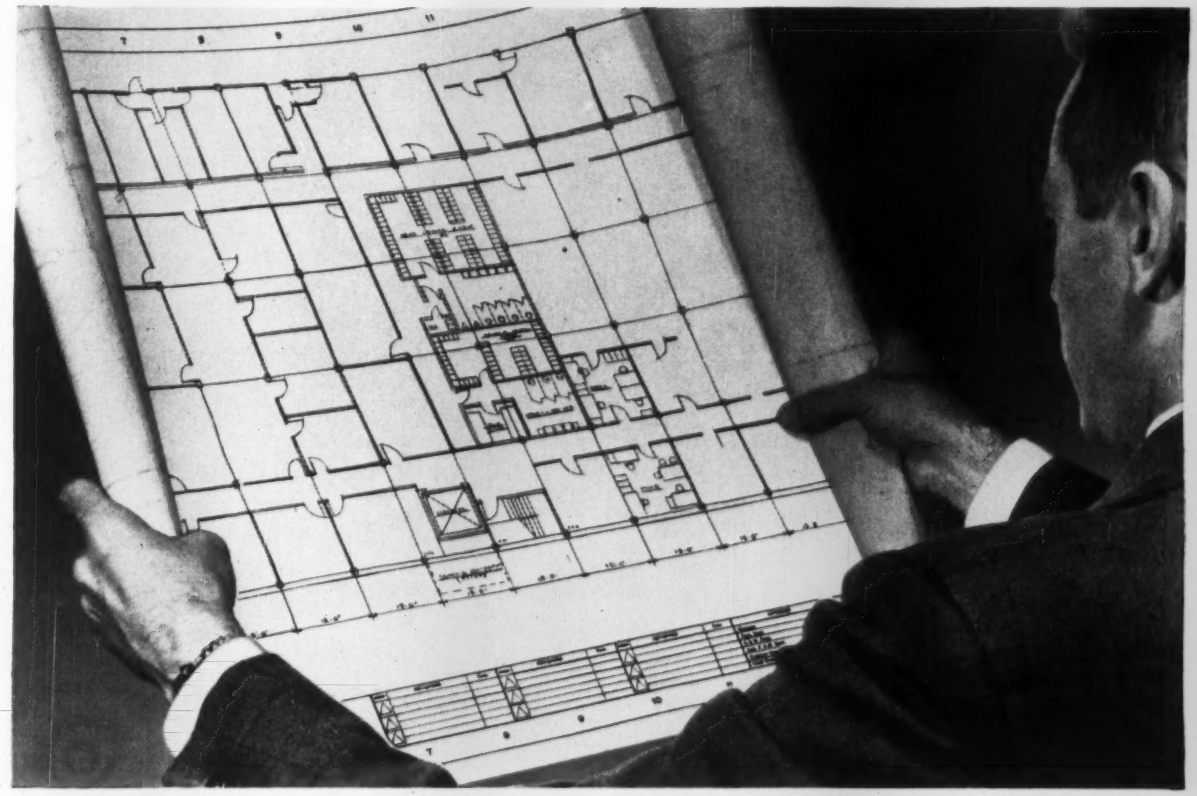
• The salt spray test, widely used as standard for plated coatings, showed unreliability and doubtful value in tests by Committee B-8 on Electrodeposited Metallic Coatings.

• The New York area will get a new corrosion exposure test site at U. S. Steel Supply Division, Newark, N. J. The proximity of a heliport to the present rooftop site on the Port Authority building in Manhattan prompted the decision by the Advisory Committee on Corrosion. The Key West, Fla., site will be dropped.

Tests Show How Overmixing And Tempering Vary Concrete

Bureau of Reclamation tests to determine how concrete properties vary with prolonged mixing, standing and adding of water reveal that:

• Slump and air content decrease significantly with extended mixing,



Kodagraph Autopositive intermediates have dense black photographic lines on a translucent paper base.

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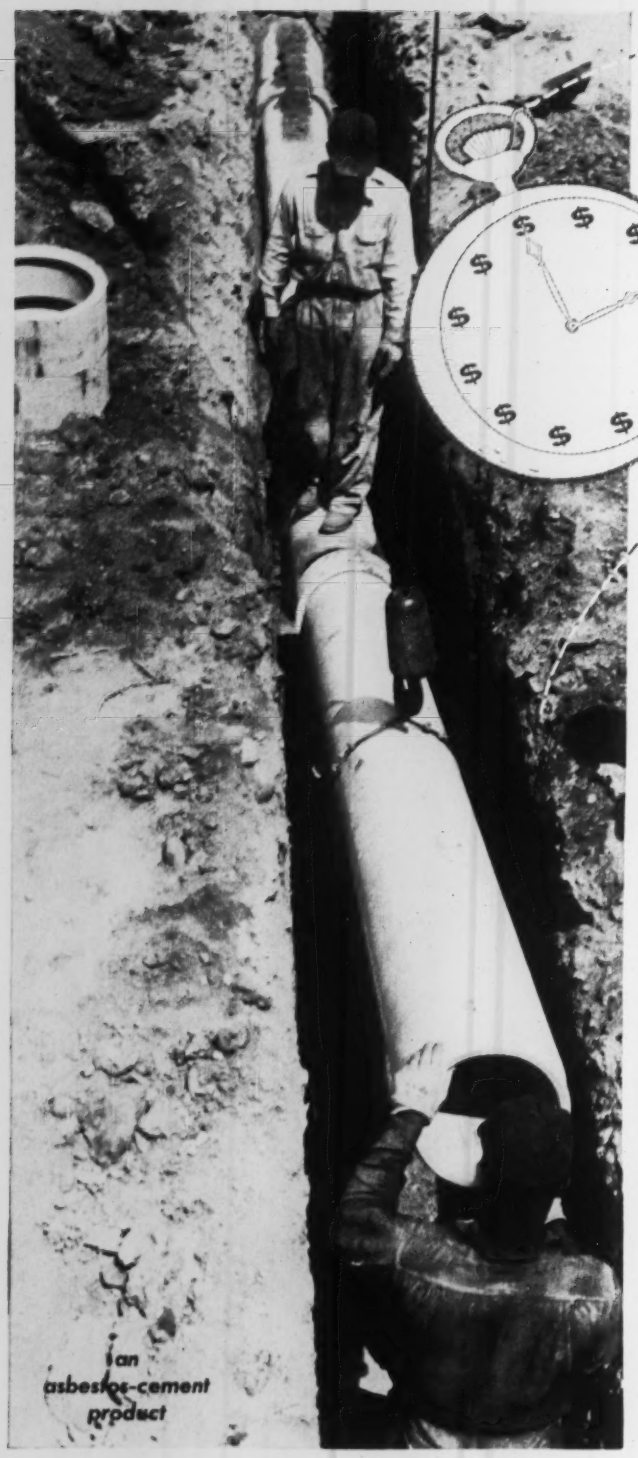

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You can assure city officials and engineers of peak performance, year after year. Transite Pipe, an asbestos-cement product is strong, durable, highly resistant to corrosion.

For further information about Transite Pressure Pipe and Ring-Tite Coupling, write for Booklet TR-160A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ontario.

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WITH THE **RING-TITE** COUPLING

either continuous or intermittent.

• Compressive strength, f'_c, rises with either standing or mixing for periods up to three hours. For air-entrained concrete, it also increases slightly if tempering follows mixing, but drops if tempering follows a standing period. For non-air-entrained batches, f'_c is affected very little by tempering plus mixing.

• Modulus of elasticity, E, generally follows f'_c, but when the mix is allowed to stand before casting, E begins to drop after one or two hours.

• Freezing-thawing resistance varies about the same as E, except that it lessens with any tempering of air-entrained concrete. It is only slightly affected by tempering of non-air-entrained samples.

• Drying shrinkage increases with any tempering. The already-known linear relation of shrinkage to initial water and air content prevails.

The investigation confirms established mixing and placing practices of the Bureau of Reclamation, as reflected in its CONCRETE MANUAL and construction specifications. The resulting recommendation, published in Concrete Laboratory Report No. C-802, is that tempering should not be used to restore the workability of overmixed concrete.

New Culvert Design Aims To End Insect Breeding Sites

The California Division of Highways has changed its standard construction specifications for roadway box culverts to prevent trickles of summer lawn-watering runoffs to form ponds and breed mosquitoes.

Where low water flows are apt to form ponds and create breeding places, the state's new standard plans call for a V-bottom invert, or for sloping the flat bottom to one side.

The division is still using the flat bottom design, however, where a culvert is serving also as a stockpass.

The change was proposed by George Umberger, superintendent of the Sacramento-Yolo Mosquito Abatement District.

Useful Addition to Highways

Construction of left-turn lanes at intersections, on some major highways in Virginia, are making an important contribution to safety.

Recent studies by the State Department of Highways indicate left-turn lanes had greatly reduced the number of accidents—in some instances by 66%—ended fatalities at one intersection, and cut property losses heavily.

STRONGEST FASTENATION

at Hollywood and Vine...

A dozen floors above the street, in America's new Tower of Music, this workman anchors steel channel as easily as squeezing a trigger—driving fasteners straight, deep and powerfully into solid concrete with the RAMSET® DUO-JOBMASTER.

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THE CAPITOL TOWER, spectacular new home of hi-fi Capitol records, dominates the heart of Hollywood, California.

First circular office building in the world, it was designed by architect Welton Becket; contractor is C. L. Peck. The $2 million structure is 13 stories high, acoustically engineered for minimum sound disturbance; has underground reverberation chambers with foot-thick concrete walls buried 25 feet into the earth.

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Books

Who's Who in Architecture

AMERICAN ARCHITECTS' DIRECTORY—Edited by George S. Koyl, 723 pp. R. R. Bowker Co., 62 W. 45th St., New York 36, N. Y. $20.

This is the first biographical directory of American architects. It lists more than 11,000 members of the profession in the United States, its territories and possessions, and Canada. Coverage includes—but is not limited to—the entire membership of the American Institute of Architects, the organization sponsoring the book. Following the alphabetical listing (under which biographical data appears), a geographical cross index locates architects by state and city.

Among the biographical facts given are the architect's home and business addresses, principal work, honors and awards, past and present jobs and firms, education, and professional affiliations.

An appendix contains considerable information of interest both to architects and to people who deal with the profession. A list of AIA publications enumerates standard contract forms and legal documents, ethical and service documents, periodicals, etc. State and territorial Boards of Architectural Registration are identified, with names and addresses of their secretaries. Member schools of the Association of Collegiate Schools of Architecture are catalogued, accompanied by names of deans and administrative officers of instruction. Among several articles incorporated are: Value of the Architect; Selection of the Architect; and Standards of Professional Practice.

The Directory supplements Who's Who in American Art, by the same publisher.

The Incas Had a System

HIGHWAY OF THE SUN—By Victor W. Von Hagen. 320 pp. Duell, Sloan & Pierce, New York; Little, Brown & Co., 34 Beacon St., Boston 6, Mass. $6.

Some 500 years ago the Inca empire exercised control over much of the western part of South America by means of road systems with a total length of at least 10,000 miles. The same system was largely responsible for the rapid fall of the Inca empire to the Spaniards when they undertook the conquest of South America.

That road system extended from Colombia through the length of Peru to Chili and into Argentina. Parts of it ran through the desert regions along the Pacific coast, other parts climbed into the mountain valleys of the Andes and through passes to the eastern slope, reaching to points as high as 15,800 ft.

Victor Von Hagen led the party that in 1952 undertook to rediscover and record the location of that fabulous road network for the American Geographical Society. His research took the better part of two years.

This book is an account of the travels of the exploratory group and of what they learned about the road system and of the people who built it and used it to bind the Inca empire together. The record is fascinating reading as a story of archeological exploration under very adverse conditions.

For engineers interested in highway construction the book would have been improved by inclusion of more details of the road system itself. Reproduction of more of the many photos that appear to have been taken would have helped.

The Inca road system was not built for use by wheeled vehicles. It was simply a route for the movement of men on foot and llamas, which the Incas used as beasts of burden. They had no wheeled vehicles.

Because the roads were not built for use of wheeled vehicles, steep grades were overcome by means of long flights of steps, as many as 3,000 at one point. The steps were wide or narrow, depending on the steepness of the slope, all built of dry-laid stone masonry.

The road itself generally was 24 ft wide, flanked by low walls of stone. Where the soil was firm, it was used for surfacing, but where it was poor, stones were laid for the surface. In some places, as in getting through narrow mountain valleys, the road width appears to have been cut down to as little as 6 ft.

Minor bridges were of dry-laid stone, corbeled out from each side to carry long slabs of rock for the central span. A few major rivers were crossed by suspension bridges, the most famous of which is the bridge of San Luis Rey. Built about 1350, that structure had a span of 148 ft at a height of 118 ft above the Apurimac River. Its cables were of hand-twisted vines supported on stone towers. They were replaced every two years. That bridge was in service until about 1890.

Other major streams were crossed by pontoon bridges, the pontoons being made up of bundles of reeds. One such bridge was still in use in 1864 when it was crossed by the

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Its capacity is 5.9 cubic yards, struck, or 7 cubic yards, heaped. It is large enough and fast enough for profitable use in pusher fleets . . . yet small enough for one-man self-loading. It cuts delays and expense for small yardage sections, clean-up, access roads, shoulders, drainage and other headache jobs that normally eat into your profits.

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Pictures show some of typical applications. Look over your current dirtmoving projects and you'll find many of these assignments . . . and others . . . where "D" can speed completion and cut your costs.

If you want more information on the D Tournapull, or if you would like to see a demonstration on your job, call your LeTourneau-Westinghouse Distributor. He is always at your service.

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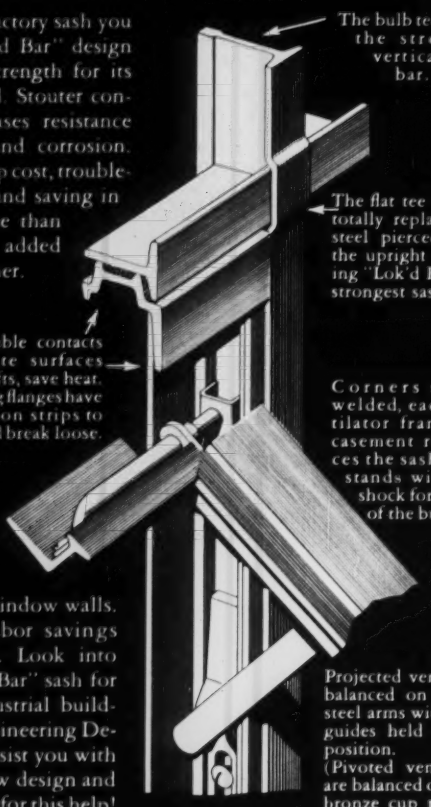
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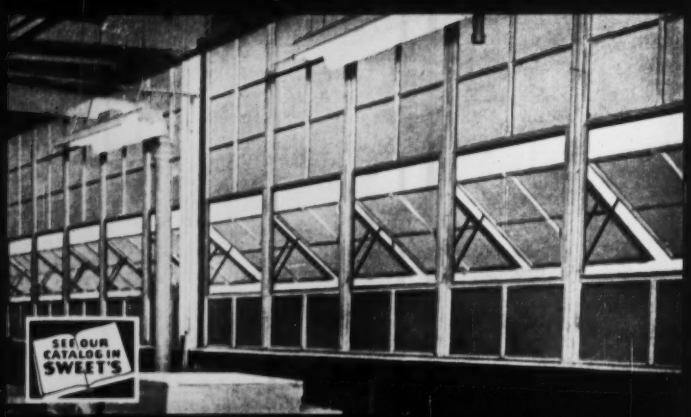

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. . . Books

American explorer-diplomat E. George Squires, who made a sketch of it reproduced in Mr. Von Hagen's book.

Today, one fifth of Peru's present highway system is built over parts of the ancient road network or follows its routes closely. Much of the remainder of the ancient road system can still be traced, but other parts are difficult to find due to the ravages of time.

Miscellaneous Notes

• **Plastic pipe** is thoroughly analyzed and evaluated in a 64-page market study entitled "Pipelines to the Future" and available from the Plastics Division, Monsanto Chemical Co., Springfield, Mass. for $1.00. The technical study is divided into two parts—the product and its market. This market, $45 million in 1955, is expected to reach $85 million by 1960. The reports points out that the industry's immediate future lies in such specialized markets as mining, agriculture, sewage and industrial waste disposal, and the petroleum and chemical fields. But when improvements in temperature-pressure relationships, material and conversion costs, fabrication and installation methods, and dimensional standards are worked out, plastic pipe will be in a position to move in on the big household pipe market which now consumes 70% of the standard metal pipe produced. For design engineers, the report contains half a dozen useful charts on installed costs of plastic and metal pipe, working pressures, and physical and mechanical and chemical resistance properties.

• **Special FHA mortgage insurance** for slum-renewal construction is described in a pamphlet, "Replacing Blight With Good Homes; FHA's Section 220 Mortgage Insurance for Urban Renewal." Section 220, a 1954 amendment to the National Housing Act, makes possible bigger loans and smaller equity investments for private capital in blighted-area jobs. What Section 220 does, who can use it and where, are covered in the pamphlet. Issued jointly by the FHA, Housing and Home Finance Agency, and Urban Renewal Administration, the pamphlet is obtainable for 10 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

• **American Standard A58.1**—Building Code Requirements for Minimum Design Loads in Buildings and Other Structures, previously adopted in 1945,

D Tournapull Rear-Dump's ability to turn around in only 24'8" enables it to spot fast in tight quarters. With 10 to 11 passes of ¾-yard shovel, unit loads 8 pay yards in about 3 minutes. Big 10'11" x 5'10½" bowl opening, with low rear entry, makes loading easy.

Hauling from pit to crusher, "D's" average 900' distance in 1½ minutes... returning in about 55 seconds. Units' 4-wheel multiple-disc air-brakes assure positive control at all times... give operators complete confidence on winding roads and steep grades.

"Better than trucks where going is tough"

says Superintendent R. E. Merritt of Oregon's Jackson County

To speed delivery of rock from quarry to crusher, Jackson County Highway Dept. teamed up 2 D Rear-Dumps to handle all crusher requirements.

On the job the "D's" encountered tight loading quarters, rough quarry terrain and underfooting, and adverse grades on haul roads. Unit's speed and maneuverability, plus ease in spotting in restricted places, helped keep crusher well supplied with rock at all times.

1800' cycle in 9¾ minutes

When pictures were taken, the 11-ton "D's" had already moved 28,000 yards of rock to the crusher. Time studies showed that each "D" was averaging 8 pay yds. per load... 1800' cycles were completed in about 9¾ minutes, including 3.65 min. to load and a 3.95 minute waiting time.

"Work in closer quarters"

Comparing the operation of the Rear-Dumps to trucks, Supt. Ralph E. Merritt said, "The D Rear-Dumps are a lot better than trucks where the going is tough." Operator Floyd Sherman added, "'D's' can get around in a lot closer quarters, too."

Safer than trucks

Besides being faster and more maneuverable than ordinary trucks on rough roads, D Rear-Dumps are also safer when dumping loads. Front-wheel-drive on "D's" keeps power and traction on solid footing well ahead of rear wheels. Because body does not need to clear frame, springs, axle, or differential, its center of gravity stays low, even during dumping. Over-size multi-disc air brakes — with more braking surface on one wheel than comparable-size trucks have on all four — prevent creeping or rolling, especially when dumping.

If you have a tough hauling job... better check D Rear-Dump's advantages for yourself. See how the 11-ton "D", 22-ton "C" or new 35-ton "B" can help you.

Tournapull—Trademark Reg. U.S. Pat. Off. DR-903-P-b

At crusher, "D" dumps 8-pay-yard load in 20 seconds. Operator Floyd Sherman said, "You can get around in a lot closer quarters with 'D's' than you can with a truck." He added, "These D Rear-Dumps are not as hard on the operator as many other types of haulers."

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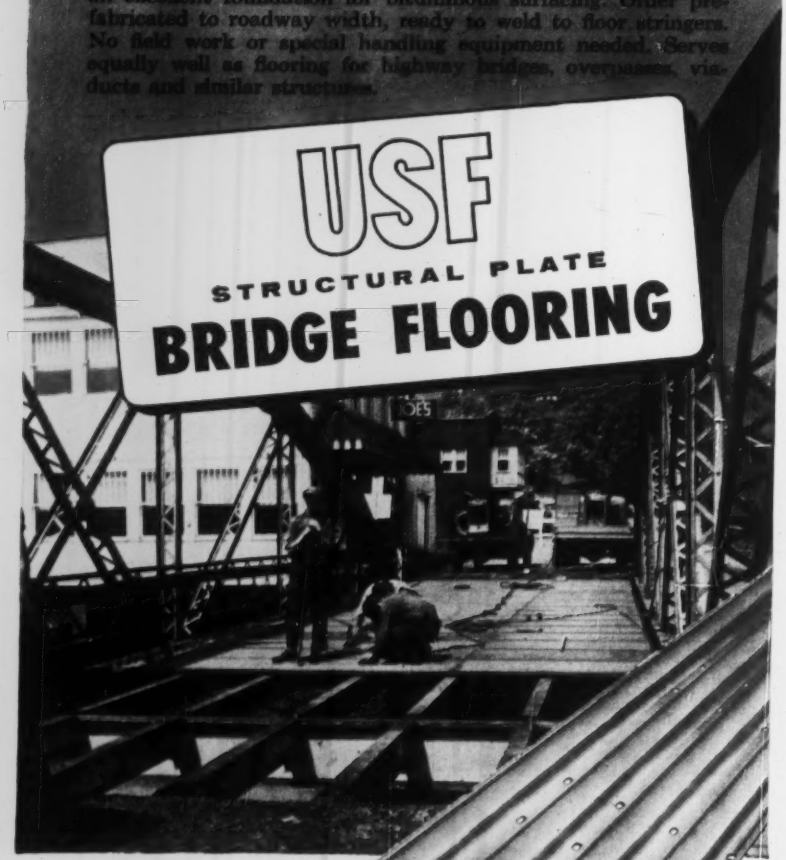

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has been revised. One of the most significant changes in the 1955 version of the standard, which is now in the hands of the printer, is the recommendation for wind loads. Copies of A58.1-1955 may be purchased for $1.50 from the American Standards Association, 70 E. 45th St., New York 17, N. Y.

• **A very helpful analysis** of the Highway Research Board reports on the flexible-pavement tests at Malad, Idaho, has been published by the National Highway Users Conference under the title "Highlights of the WASHO Road Test." Largely by the use of diagrams, the essential information developed during the tests is presented in concise form. Copies of this 24-page pamphlet can be obtained from the NHUC at the National Press Building, Washington 4, D. C.

New Books

THE THEORY of HYDRODYNAMIC STABILITY —By C. C. Lin. 155 pp. Cambridge University Press, 32 E. 57th St., New York 22. $4.25.

ENGINEERING DRAWING and GEOMETRY—by Randolph P. Hoelscher and Clifford H. Springer. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $8.00.

MODERN SURVEYING for CIVIL ENGINEERS —by Harold Birchal. Second edition. 528 pp. Philosophical Library, Inc. 15 E. 40th St., New York 16. $15.00.

SURVEYING for CIVIL ENGINEERS—by Philip Kissam. 716 pp. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. $8.50.

AIR CONDITIONING REFRIGERATING DATA BOOK—Design volume. Ninth edition. American Society of Refrigerating Engineers, 234 Fifth Ave., New York 1. $10.00.

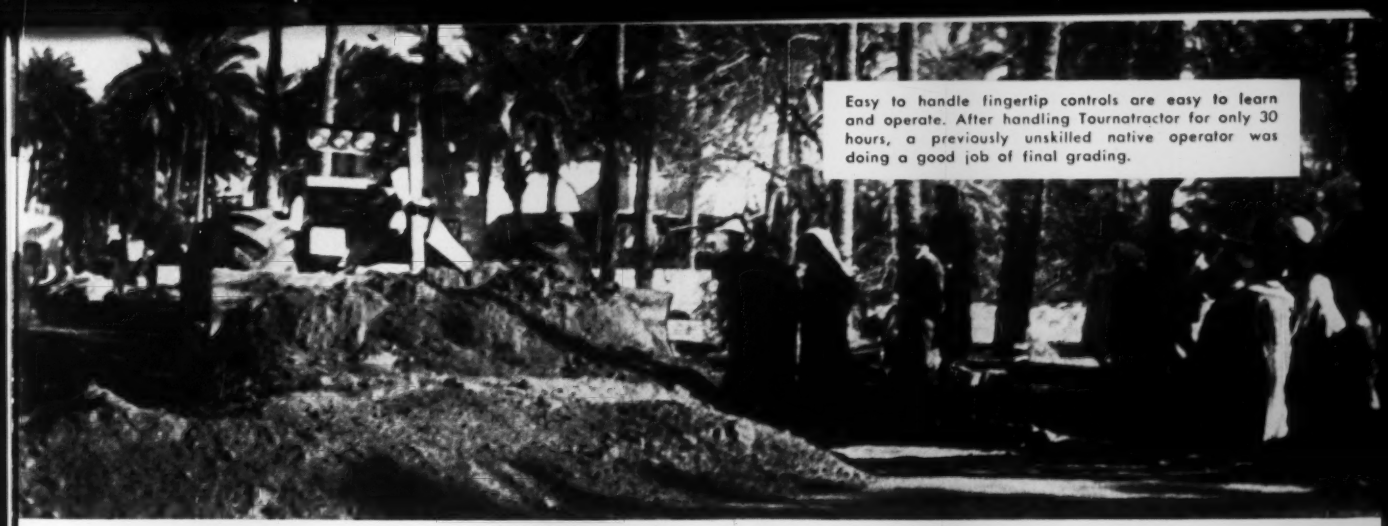
DIESEL ENGINE PRINCIPLES and PRACTICE —848 pp. Philosophical Library, Inc., 15 E. 40th St., New York 16. $17.50.

HYDRAULIC & PNEUMATIC OPERATION of MACHINES—by H. C. Town. 192 pp. Philosophical Library, Inc., 15 E. 40th St., New York 16. $7.50.

PLASTICS and BUILDINGS—by E. F. Mactaggart and H. H. Chambers. 181 pp. Philosophical Library, Inc., 15 E. 40th St., New York 16. $12.00.

1955 BOOK of ASTM STANDARDS—Part 3 —Cement, Concrete, Ceramics, Thermal Insulation, Road Materials, Waterproofing, Soils. 2020 pp. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $13.50.

PEACEFUL USES of ATOMIC ENERGY—Proceedings of the International Conference in Geneva, August 1955. Volume 2: Physics Research Reactors. 471 pp., $8.00; Volume 3: Power Reactors. 389 pp. $7.50; Volume 14: General Aspects of the Use of Radioactive Isotopes: Dosimetry. $6.50; Volume 15: Applications



Easy to handle fingertip controls are easy to learn and operate. After handling Tournatractor for only 30 hours, a previously unskilled native operator was doing a good job of final grading.

Rubber-tired tractor speeds street construction *in old Baghdad*

Progressive dirtmoving contractors all over the world are taking advantage of the ease of maintenance and operation, speed and high rate of production offered by the versatile Tournatractor. For example, here's how one earthmover, in ancient Baghdad, Iraq, uses its rubber-tired tractor to speed production.

Baghdad today is a city of great contrast. On one hand, you see ultra-modern apartment houses, gas stations, and soft-drink stands. On the other, are ancient mosques and mud houses. Modern buses and automobiles mingle with throngs of camels and donkeys. Construction goes on everywhere. Even ancient narrow stone streets are giving way to broad, blacktop avenues.

A typical road-modernization project was recently handled in the Adhamia Subdivision of Baghdad by United Contracting Co. Their rubber-tired Tournatractor has proved invaluable for building subgrades before final bituminous paving. It maneuvers easily in the narrow streets. Big low-pressure tires absorb shocks when traveling on rough stone and earth roads — yet roll over newly-laid pavement and curbing without causing damage. 19 mph speeds permit fast travel between assignments . . . enable Tournatractor to shuttle back and forth and handle dozing assignments on two or more scattered projects at the same time.

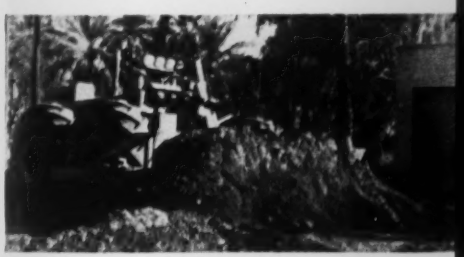
More work, lower cost

Tournatractor has reduced contractor's equipment inventory and payroll, too! United Contracting Co. officials estimate it would have taken at least four 45 hp crawler-tractors and one or two motor-graders to handle the work done by this single 186 hp (new machines 208 hp) tractor-on-rubber. This is partly due to the superior working speeds and mobility of the rubber-tired unit; partly to the large amounts of material it handles on every pass; partly to the effective compaction of the rocky subgrades by its big 2-ft. wide low-pressure tires.

United is finding many uses for this versatile machine. With their recent purchase of a double-drum power-control unit, this high-speed tractor can be used to operate a scraper or rooter, in addition to dozing and pushing. This enables the company to accept contracts for larger, more varied jobs that formerly had to be refused or subcontracted.

Ask for more information

If you are interested in speed and versatility for your work, contact your LeTourneau-Westinghouse Distributor. He will be glad to give you complete information on these modern, rubber-tired tractors.



Tournatractor dozes capacity 2½-yard loads of loam, gravel, gumbo, and rock. Push distances range from 100′ to 1000′ depending on cut and fill required. Here material is pushed to both sides of the street to build up foundations for sidewalks. Low-pressure tires do not cut into finished grades even after heavy rain.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-981-G-b

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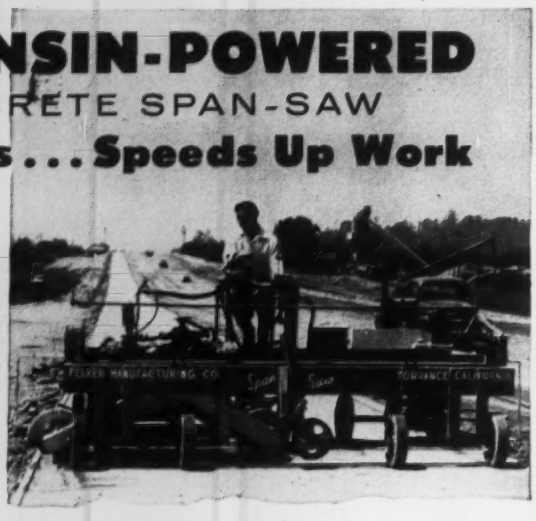

This V-type 4-cylinder model is one of two Wisconsin Engines that operate the Concrete Span-Saw.

Here is an interesting construction application for Wisconsin Heavy-Duty Air-Cooled Engines that really demonstrates the rugged serviceability of these engines.

Used for diamond-sawing control joints in new highway and airport concrete, this Felker Di-Met Span-Saw spans the concrete slab, riding either the header boards or concrete. Powered by two Wisconsin Air-Cooled Engines, this multi-bladed machine saws control joints at desired intervals and, according to the builders (Felker Mfg. Co., Torrance, Calif.), speeds up work, cuts costs and minimizes manpower.

Wherever there's tough, dirty work to be done, Wisconsin Engines rate "Number One" in steady-going performance, low-cost maintenance and heavy-duty dependability. Every Wisconsin Air-Cooled Engine has such features as tapered roller bearings at BOTH ends of the crankshaft, rotary type high tension *outside* magneto, pump-circulated lubrication and efficient AIR-COOLING at all temperatures from extreme sub-zero to 140° F.

All models (3 to 36 hp.) can be furnished with electric starter and generator, or starter only and may be equipped with Stellite exhaust valves and valve seat inserts, clutch and clutch reduction assemblies, and rotating screen. Reduction assemblies available for all models except the VG4D.

You can't do better than to specify "Wisconsin Power" for your equipment. Write for Bulletin S-188.

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of Radioactive Isotopes and Fission Products in Research and Industry. $7.50; Columbia University Press, 2960 Broadway, New York 27.

ANALYSIS OF STRUCTURES—by M. Smolira. 173 pp. Concrete Publications Ltd., 14 Dartmouth St., London S. W. 1, Eng. $4.00.

HYDRAULIC & PNEUMATIC OPERATION OF MACHINES—by H. C. Town. 192 pp. Philosophical Library, 15 E. 40th St., New York 16. $7.50.

DIESEL ENGINE PRINCIPLES AND PRACTICE—848 pp. Philosophical Library, 15 E. 40th St., New York 16. $17.50.

MATHEMATICAL THEORY OF ELASTICITY—by I. S. Sokolnikoff. Second Edition. 587 pp. McGraw-Hill Book Co., 330 West 42nd St., New York 36. $9.50.

AMERICAN ARCHITECTS' DIRECTORY—748 pp. R. R. Bowker Co., 62 W. 45th St., New York 36. $20.00.

Reports and Pamphlets

PROCEEDINGS OF THE CONFERENCE ON BUILDING RESEARCH, OTTAWA, OCTOBER 21 TO 23, 1953—Division of Building Research, National Research Council, Ottawa, Canada. $3.50.

IMPROVING AMERICA'S HOUSING—National Association of Home Builders, 1625 L St., N. W., Washington 6, D. C.

ASTM STANDARDS ON CEMENT (WITH RELATED INFORMATION)—American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.00 to ASTM members; $2.75 to others.

PLANE COORDINATE INTERSECTION TABLES (2½-MINUTE) OHIO—Special Publication No. 336. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 45c.

ASTM SPECIFICATIONS FOR STEEL PIPING MATERIALS—American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $3.00 to ASTM members; $4.00 to others.

ELEVATED-TEMPERATURE PROPERTIES OF CARBON STEELS—Special Technical Publication No. 180. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $3.75.

A STUDY OF STEPPED CONCRETE FOOTINGS—by Clayton M. Crosier. Bulletin of Engineering and Architecture, No. 33. University of Kansas, Lawrence, Kan.

GRAPHICAL SYMBOLS FOR PLUMBING—American Society of Mechanical Engineers, 29 W. 39th St., New York 18. $1.00.

THE FIVE FUNDAMENTALS OF MODULAR DRAFTING—American Institute of Architects, 1735 New York Ave., N. W., Washington 6, D. C.

COMPARISON BETWEEN STANDARD AND SMALL ORIFICE RAINGAGES—by F. A. Huff. Circular No. 49. Department of Registration and Education, State of Illinois, Urbana, Ill.

ATOMS IN YOUR BUSINESS—Cleveland Engineering Society, 2136 E. 19th St., Cleveland 15, Ohio. $1.00.

WINTER CONSTRUCTION—Division of Building Research, National Research Council, Ottawa, Canada. 10c.

How L.G. Arnold, Inc.

licks spongy haul road, 20% grades

On regrading 12½ miles of Wisconsin Highway 95, from Blair to Hixton, L. G. Arnold, Inc., of Eau Claire, Wis., found Tournapulls a big help in licking a tough hauling problem. Their job was to widen grade from 20′ with 4′ shoulders to 22′ with 8′ shoulders. It also involved raising the road 2 to 4 ft., including a 15″ sand lift. The other material handled was clay and shale mixed and silty sand.

Three miles of this 612,000-yd. job lay in a swampy area where bubbling springs made road soft and spongy. 3 weeks of rain, after starting the job, made spongy conditions worse.

Equipment used on this project included 7 new C Tournapulls, 3 Super "C's", 6 crawler-scraper units, 10 crawlers for pushing and dozing, 1 rooter, and 2 motor patrols.

7 loads per hour on 6000′ cycle

On a long haul from borrow pit, over a typical 6000′ cycle, each of six Tournapulls on this operation averaged 8.3 min. per trip, 7 trips per hr. Contractor estimated the 6 "C's" averaged 20,000 yds. in a 50 hr. wk. The soft haul road had a 20% grade from highway to borrow pit. Rigs traveled in 2nd gear most of haul distance.

3-mile one-way haul to build 15″ sand lift

Later, the Tournapulls were used to haul the 15″ sand lift on hauls ranging up to 3 miles one way. On the long operation, rolling resistance on the sandy, clayed-loam road was as high as 250 to 300 lbs. per ton. "C's" were equipped with sideboards and 24:00 x 25 tires. These large tires, with 45 lbs. pressure, made it possible for rigs to go through spongy sections in the new grade, trip after trip, without damage to the soft sub-grade.

This time study was taken on the sand lift operation while the 7 "C's" worked a 5.2-mile cycle:

Time in Borrow Pit (2000′ from haul road)	6.7 min.
Travel 10,000 ft. @ 16.2 mph avg.	7.0 min.
Travel 2,000 ft. @ 8.0 mph avg.	2.9 min.
Return 11,000 ft. @ 16.4 mph avg.	7.7 min.
Return 1,000 ft. @ 8.0 mph avg.	1.4 min.
Total cycle time	25.7 min.

Each machine averaged 14 yds. per load. On this 5.2-mi. swing the 7 "C's" totaled 1900 yds. per 10-hr. day.

"Sure-footed in wet going"

Performance of the C Tournapulls was praised highly by the men on the job. Said Phil Dudenhoefer, Grade Superintendent, "I like the sure-footedness of the C Tournapulls in wet and slippery going." On the grading operation, Ralph Ring, Master Mechanic, said, "Tournapulls unloaded by themselves while other units had to be pushed to unload."

Commenting on the sand lift operation, Norman Hulett, Superintendent, had this to say: "Tournapull is the most sure-footed piece of equipment I've ever seen on rubber. I never figured I'd see rubber tires go where these can go."

You, too, need speed and versatility to meet your dirtmoving problems, on long hauls, short hauls, in bad weather, spongy footing, and other adverse conditions. Check Tournapulls for the answer. Write or phone your LeTourneau-Westinghouse Distributor for a demonstration on your job. He will be glad to show you how to get lowest-net-cost-per-yard with Tournapulls.

Tournapull—Trademark Reg. U.S. Pat. Off. P-905-H-b

C Tournapull loads clay and shale for 3000-ft. haul to roadway seen in distance. Occasional slabs of shale made loading difficult. Avg. load time was 65 sec. over 90-100 ft.

Spongy, soft condition of roadway is shown. On the 12½-mile job, 9000 ft. of drainage pipe and 7 bridge structures will be installed.

Loading sand for sand lift, "C's" "float" over soft footing with big 24:00 x 25 tires.

LeTourneau-WESTINGHOUSE Company

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A Subsidiary of Westinghouse Air Brake Company

CLYDE "SAN FRANCISCO BAY BRIDGE" HOISTS TEAM
WITH NEW CLYDE STEEL ERECTORS' HOISTS

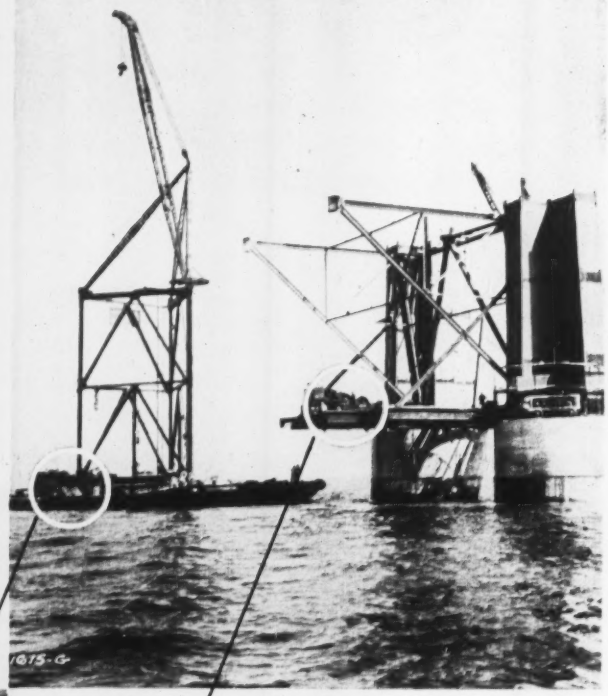
Spotting Steel on World's Largest Suspension Bridge

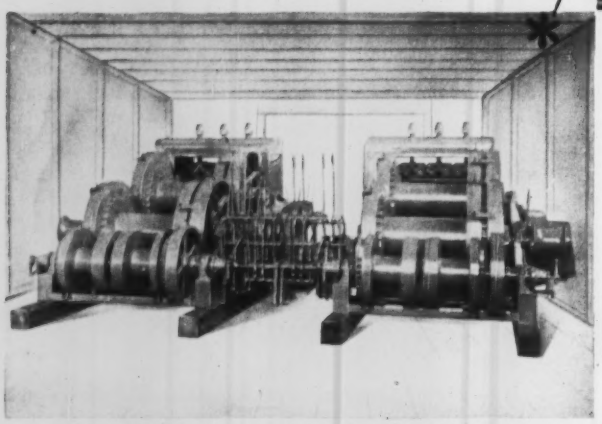
The twenty-four year old Clyde hoists operating the barge mounted derrick shown at right are proof of Clyde's sound engineering, quality construction and long-life dependability! Built in 1934 for The American Bridge Division, U. S. Steel Corp., for the San Francisco Bay Bridge job, these dependable units have been used almost continuously on a wide variety of applications . . . from one 'world's longest suspension bridge' to a new 'world's longest suspension bridge' now being constructed across the Mackinac Straits! Here's a record of an active, profitable life span of more than two decades under severe and exacting conditions!

The engineering and structural advantages of Clyde's complete line of hoists are long-life, quality-plus Clyde features. Their capacity to do a job profitably recommends Clyde for the consideration of the most critical and cost-wise buyer.

Clyde's advanced engineering principles assure long, continuous, economical, safe and easy operation.

Two Clyde Frame 8 Hoists will operate the Creeper Derrick shown below as it was being erected on the third tier of the main suspension tower of the Mackinac Straits bridge job



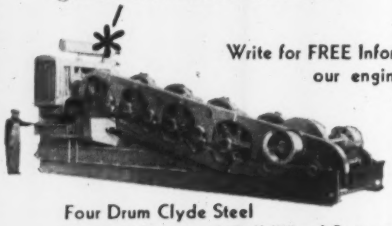


Clyde Twin Unit Hoists built in 1934 for American Bridge Company, used on San Francisco Bay Bridge . . . Now in use on Mackinac Straits Bridge.

Here is equipment built to shave critical dollars from competitive bids now and a quarter of a century away!

If your material handling requirements call for dependable equipment, it will pay you well to get the facts from CLYDE!

Write for FREE Information! The services of our engineering department are at your disposal.



Four Drum Clyde Steel Erectors' Hoist with Bull Wheel Swinger

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Legal

Recovery for Extra Work Depends on Contract Terms

If a contractor is submitting a claim for extra work, he should be able to show that he has complied with all contract requirements relating to extra work. Failure to present the claim within the specified time may be fatal.

This happened to a Kansas subcontractor, whose extra work was governed by the terms of both the general and the subcontract. Under the terms of the general contract, extra work could be done only on written authorization by the owner and claims for the work had to be submitted within a reasonable time. The same conditions were imposed by the subcontract, except the time for filing the claims was limited to a week from the time the work was ordered.

A suit by the subcontractor for extra work was dismissed[1]. He hadn't met the contract requirement of filing the claim with the general within the one-week period.

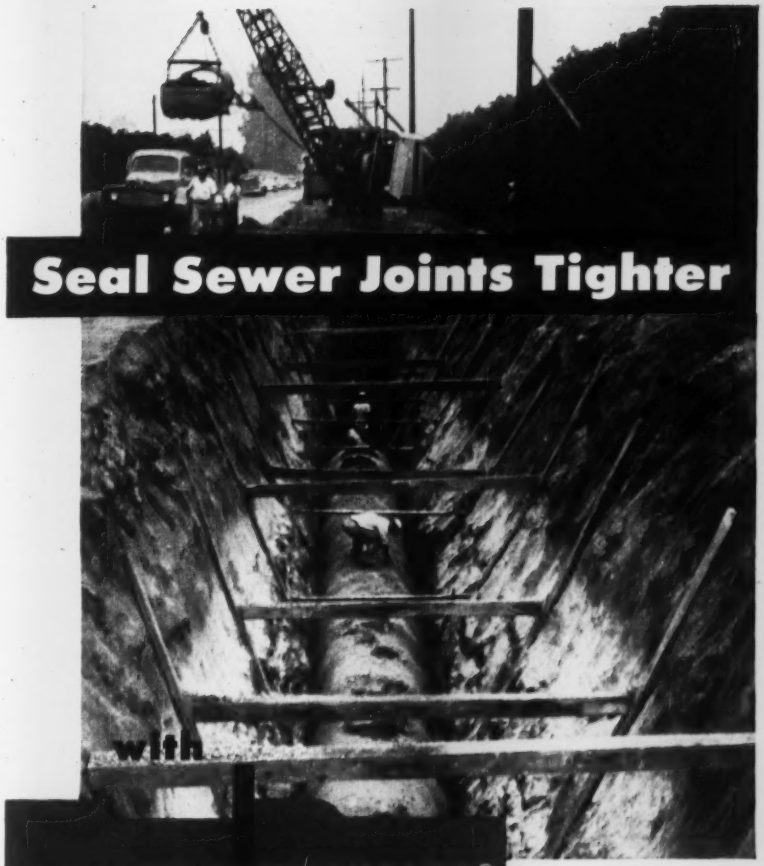
(1) State v. Koch, 272 S.W. 2d 22, Kansas City Court of Appeals, Oct. 1954.

Arbitrators Required to Be Independent and Impartial

Arbitrators are required to be impartial. If they run to others for advice and counsel, the losing party can sometimes upset the award. Such a situation arose in California last year.

A construction contract provided that all disputes would be determined by arbitration. A dispute that arose was referred to the arbitrators who decided against the contractor. The contractor appealed, claiming that one of the arbitrators had consulted an attorney of unrevealed identity regarding the law involved in the case and that such conduct was improper and constituted a basis for setting aside the determination of the arbitrators. The appellate court sustained the contractor's contention and set aside the determination of the arbitrators.[1]

The court stated: "The arbitration process is essentially judicial in its nature. 3 Am. Jur., Section 89, p. 918; 6 C.J.S., Arbitration and Award, Section 1, p. 153. No one should act or be permitted to serve who cannot be entirely impartial and objective in the performance of his duties. The New York Court of Appeals in American Eagle Fire Ins. Co. v. New Jersey Ins. Co., Inc., 240 N.Y. 398, 405, 148 N.E. 562, 464, has well stated the matter: 'But, first, the practice



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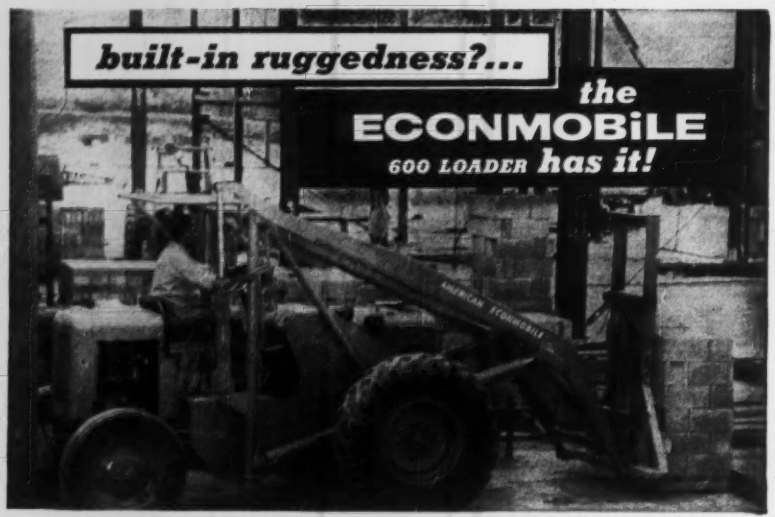

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The ECONMOBILE has these other outstanding features: Hoisting height up to 22'; reach up to 6'; power; stability; versatility; mobility; maneuverability; traction and flotation.

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of arbitrators of conducting themselves as champions of their nominators is to be condemned as contrary to the purpose of arbitrations, and as calculated to bring the system of enforced arbitrations into disrepute. An arbitrator acts in a quasi judicial capacity, and should possess the judicial qualifications of fairness to both parties, so that he may render a faithful, honest, and disinterested opinion. He is not an advocate whose function is to convince the umpire or third arbitrator. He should keep his own counsel, and not run to his nominator for advice when he sees that he may be in the minority. When once he enters into an arbitration, he ceases to act as the agent of the party who appoints him. He must lay aside all bias, and approach the case with a mind open to conviction and without regard to his previously formed opinions as to the merits of the party or the cause. He should refrain sedulously from any conduct which might justify even the inference that either party is the special recipient of his solicitude or favor.'"

(1) Griffith Co. V. San Diego College for Women, 280 P. 2d 203, Court of Apeals of Cal., March 25, 1955.

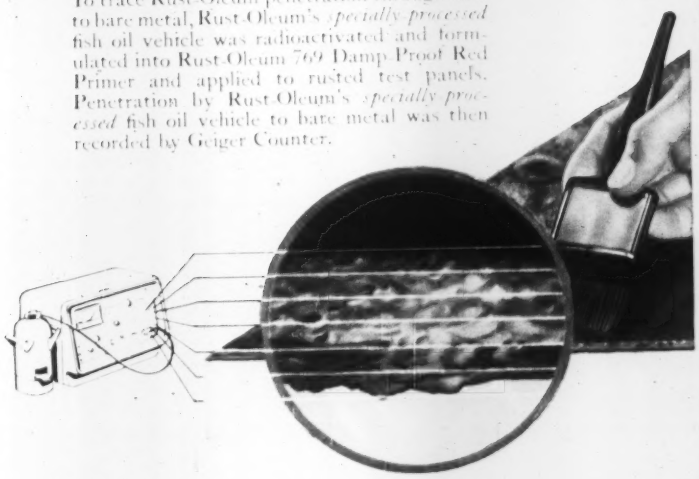
Substantial Performance Of Construction Contracts

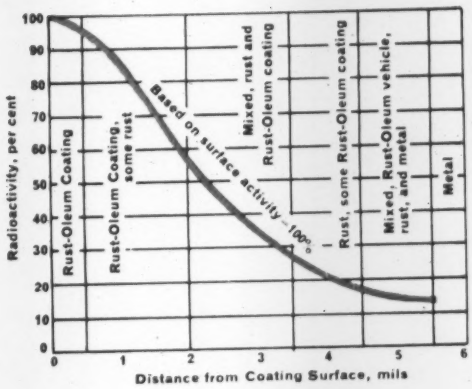
Ordinarily, a party who agrees to perform certain work for a specified price is not entitled to compensation unless he has fully performed all the terms and conditions of the contract. An exception to this rule has been made in cases of construction contracts, where a contractor who has substantially performed the contract is entitled to recover the contract price, less the cost of remedying defects or the cost of completing the work.

The question often arises as to what constitutes substantial performance. Substantial performance means performance except for minor defects which can be remedied but does not apply where there has been a willful or deliberate deviation from what was called for by the contract, or where the owner does not get substantially the work called for by the contract.'

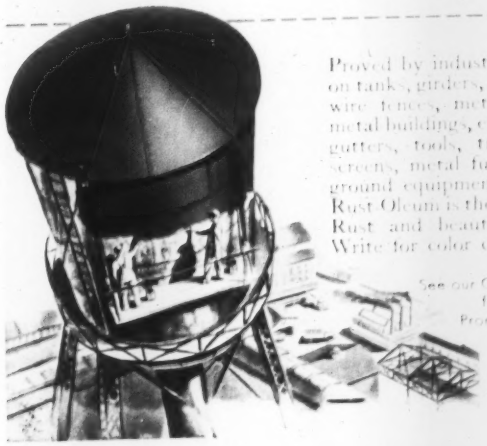
According to a New York court, "there is a limit to the application of this rule, and a party who knowingly and willfully fails to perform his contract in any respect, or omits to perform a substantial part of it, cannot be permitted, under the guise of this rule, to recover for the value of the work done; and the trend of the more recent decisions is to hold that the percentage of the omitted work may, in

To trace Rust-Oleum penetration through rust to bare metal, Rust-Oleum's *specially processed* fish oil vehicle was radioactivated and formulated into Rust-Oleum 769 Damp-Proof Red Primer and applied to rusted test panels. Penetration by Rust-Oleum's *specially processed* fish oil vehicle to bare metal was then recorded by Geiger Counter.





It's easy to actually see Rust-Oleum penetration through rust to bare metal by following the curved line on the graph above. The curved line illustrates Rust-Oleum *penetration* at each mil level down to bare metal as recorded by Geiger Counter and Gas-Flow Proportional Counter.



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The results of nearly three years radioactive research prove that Rust-Oleum's *specially-processed* fish oil vehicle penetrates through rust to bare metal.

This penetration enables you to stop rust, because the Rust-Oleum fish oil vehicle soaks through the rust to bare metal and into the tiny pits where it drives out air and moisture that cause rust. Because of this penetration, you can apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound rusted surfaces—usually eliminating costly surface preparations. Rust-Oleum resists salt water, sun, fumes, heat, humidity, and weathering.

Attach coupon to your letterhead for your thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish Oil Based Coating Into Rust On Steel Specimens," as prepared by Battelle Memorial Institute technologists.

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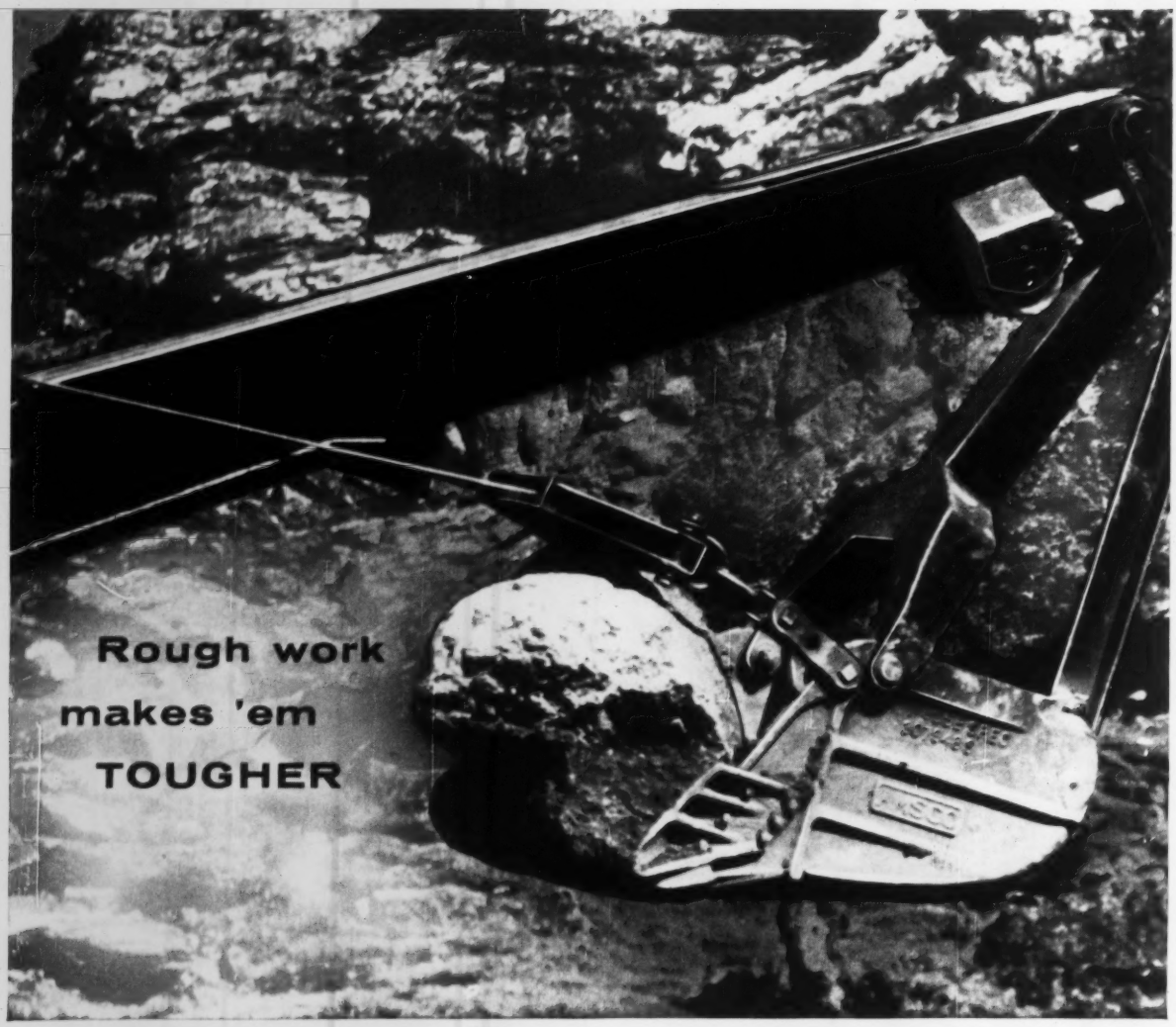

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and of itself, be sufficient to show that there has not been substantial performance."[2] In this case, the value of the work not performed amounted to about 14 per cent of the contract price and the court held that this in itself was sufficient to hold that there had not been substantial performance of the contract.

In another case,[3] where the contractor brought an action to foreclose a mechanic's lien and to recover a balance allegedly due under the contract, the court denied the contractor a judgment where it was shown that the value of the incompleted work amounted to 28 per cent of the contract price.

(1) Jacob & Youngs v. Kent, 230 N.Y. 239, 129 N.E. 889.
(2) North American Wall Paper Co. v. Jackson Construction Co. Inc., 167 App. Div. 779, 153 N. Y. Supp. 204.
(3) Landry v. Benjamin, 141 N.Y.S. 2d 719, N.Y. Supreme Court, Nassau County, April 13, 1955.

Rights of Materialmen

One who furnishes material to a subcontractor does have an interest as third party beneficiary in the sub's performance bond and can sue the surety for payment.

The rule was applied in a New York case which involved a contract for a plumbing work and required the subcontractor (1) to furnish materials and labor free of any liens by any third party and (2) to indemnify and save harmless the general contractor and the owner against loss, damages or any expenses. The sub agreed to furnish a performance bond which was to be paid for by the general contractor.

An action was brought by a materialman to recover for materials furnished the subcontractor.

The case was dismissed by the trial court on the ground that the materialman had no right as a third-party beneficiary under the bond and that the bond was made for the benefit of the general contractor. This judgment was reversed by the appellate courts, which held that where the contract provided that the subcontractor was to furnish work and materials free of the lien of any third party, the dominent purpose of the bond was to insure payment of materialmen of subcontractors and was enforceable by such materialmen as third-party beneficiaries.[1]

(1) Daniel-Morris Co. v. Glens Falls Indemnity Co., 126 N.E. 2d 750, New York Court of Appeals, April 28, 1955.

(These summaries of court decisions are prepared by I. Vernon Werbin, New York attorney and civil engineer.)

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† **R. I., Quonset Point**—CONTROL CENTER, etc.—BA 4/26—First Naval Dist., 495 Summer St., Boston, Mass., radar control center and directional range, Naval Air Station, NOy 86169, Spec. 44905. $579,000. Plans deposit $40. CD 8/6/53.

HEAVY CONSTRUCTION—LB & CA

Samuel Aceto & Co., 40 Preble St., South Portland, Me., LB $108,540, est. $109,000, sewers, force main, LACONIA, N. H. City, Arnold J. O'Mara, city engr., Laconia, N. H. Metcalf & Eddy, Statler Bldg., Boston, Mass., engrs.

MASSACHUSETTS—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,

Leo Constr. Co., Inc., 1083 School St., Webster, Mass. LB $91,242, est. $108,431. ER 16 Sec. 1 Contr. C, rein.-con. bridge with roadway approaches, Charlton. Bids Apr. 3. CD 3/30.

▲ **CONNECTICUT**—State Hy. Comn., State Office Bldg., Hartford,

American Bridge Div., U.S. Steel Co., 525 Wm. Penn Pl., Pittsburgh, Pa. CA $7,607,494. complete superstructure, incl. bents, drainage for 3 viaducts, Connecticut Turnpike, Bridgeport, Fairfield Co. CD 2/23, under LB.

BUILDINGS—LB & CA

Winston P. Titus, 33 Elm St., Lakeport, N. H., LB $354,731, Item 1; LB $495,848, Item 2, co-operative HIGH SCHOOL, MEREDITH-CENTER HARBOR, N. H. The Interlake School Dist., Martin Hefferman, supt. Schools, Meredith, N. H. Bids Apr. 2. CD 3/27.

▲ **E & F Constr. Co.,** 94 Wells St., Bridgeport, Conn. LB $3,614,225. 6 story HOSPITAL addn., incl. POWER PLANT, LAUNDRY, etc., BRIDGEPORT, CONN. Bridgeport Hospital, Grant St., Bridgeport, Conn. Bids Apr. 4. CD 3/16.

▲ **Rex Constr. Co., Inc.,** 153 Homestead Ave., Hartford, Conn. CA Approx. $3,500,000, est. $3,000,000-$4,000,000, SHOPPING CENTER, 25 acre tract southeast corner Park Ave. and Expressway, WINDSOR, CONN. Park Reginal Corp., c/o Bradley S. Bates (atty), 750 Main St., Hartford, Conn. CD 4/6.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

N. Y., Idlewild—FEEDER—BA 4/24—At office Chief Engineer, Port of New York Auth., 111 Eighth Ave., New York, Zone 11, furnishing, installing second feeder for ASR-3 installation at Runway 4-22, New York International Airport, Contr. NYA-220-012, adv. ENR 4/19. CD 1/18/54.

Pa., Phila.—CHAIN LINK FENCING, etc.—BA 4/27—City, Dpt. Procurement, Bids 5907, 8 ft. chain link fencing, backstops, tennis courts, W. Fairmont Park; Bid 5908, curbing and concrete footways, various locations, Fairmont Park. CD 12/28/45.

▲ **N. J., Elizabeth**—BA 5/3—City, City Hall, imprv. sewerage sys., intercepting sewers, $1,400,000. Plans deposit $50, Graffman & Kreb, 433 N. Broad St., Elizabeth, and Alexander Potter Assoc., 50 Church St., New York, N. Y., engrs. CD 9/26.

HEAVY CONSTRUCTION—LB & CA

▲ **NEW YORK**—State Dpt. P. Wks., John W. Johnson, supt., The Gov. Alfred E. Smith State Office Bldg., Albany,

A. E. Ottaviano, Inc., Croton on Hudson, N. Y. CA $7,125,048. constr. 2.49 mi. portion of State Thruway's New England Sect. and 3.05 mi. access roads from Chatsworth Ave. in Larchmont northeastward to Mamaroneck Ave., in Mamaroneck, Westchester Co. CD 3/9, under LB.

▲ **NEW YORK**—Bureau Contracts & Accounts, The Gov. Alfred E. Smith State Office Bldg., Albany,

N. Y.—Yonkers Contracting Co., Inc., 959 Midland Ave., Yonkers, N. Y. CA $2,759,707, est. $3,278,000. (6 bidders) constr. 4.91 mi. portion of Erie Sect. of State Thruway and 1.45 mi. of access roads from Four Mile Level Rd. just east of Irving northeastward to Cain Rd., (Rte. 323), Erie Co.;

N. Y.—Johnson, Drake & Piper, Inc., 86 Trinity Pl., New York 6, N. Y. CA $2,635,833, est. $3,369,000. (11 bidders) grading, structure work in preparation for future paving of 3.4 mi. six-lane divided sect. of Palisades Interstate Parkway from Rte. 59 east of Nanuet, southward to Convent Rd. and grading, paving 2.18 mi. of access roads, Rockland Co. CD 2/24, under LB.

Curro Constr. Co., Union Commerce Bldg., Cleveland, O. CA $556,616. 9,000 ft. pipe line from Falconer to Buffalo Sts., JAMESTOWN, N. Y. City, Jamestown, N. Y.

▲ **NEW JERSEY**—State Hy. Dpt., State Hy. Office Bldg., 1035 Parkway Ave., Trenton,

Samuel Braen's Sons, 662 Goffle Rd., Hawthorne, N. J., LB $1,318,634. paving Route U.S. 202 between Route 10 and U.S. Route 46, Hanover and Parsippany-Troy Hills Twps., Morris Co. Bids Apr. 3. CD 3/19.

▲† **Roscoe Engr. Corp. & Charles Rose,** 1107 19th St. N. W., Wash., D. C. CA $11,429,000. aircraft launching and recovery test center, Naval Air Station, NOY 91177, Spec. 49797, LAKEHURST, N. J. Dpt. Navy, Phila. Naval Base, Phila., Pa. CD 4/5, under LB.

J. M. Stipp Co., 1607 Chelten Ave., Phila., Pa. CA $163,810 pipe constr. at Roxborough pumping plant, PHILA., PA. CITY, Dpt. Procurement, City Hall Annex, Phila., Pa. Samuel S. Baxter, water comr. CD 3/11/46.

BUILDINGS—LB & CA

Wesolowki Brothers, Depew, N. Y. Own Forces. $900,000. 60 ranch type DWELLINGS in Turbick Rd. near Transit Rd., DEPEW, N. Y.

▲ **Joseph R. Culhane,** Robins Nest, West Chester, Pa. Separate Contracts. $4,000,000. RESIDENTIAL DEVELOPMENT, 253 units, Uwchlan Rd., DOWNINGTOWN, PA.

Gorchov Bros., 55 N. 52 St., Phila., Pa. Separate Contracts. $350,000. RESIDENTIAL DEVELOPMENT, 69 St. and Chester Ave., PHILA, PA.

James Lewis Corp., 252 Long Lane, Upper Darby, Pa. Separate Contracts. $350,000. RESIDENTIAL DEVELOPMENT, Lewis Lane, ROSEMONT, PA.

▲ **A. C. Evans & Son, Inc.,** 774 Chester Pike, Ridley Park, Pa. Separate Contracts. $1,500,000. RESIDENTIAL DEVELOPMENT, 100 units, N. Britton Rd., SPRINGFIELD, PA.

▲ **Gwynedd Gardens,** c/o J. T. Jackson Co., Roosevelt Blvd. and Rising Sun Ave., Phila., Pa. Separate Contracts. $1,500,000. RESIDENTIAL DEVELOPMENT, Bethlehem Pike, SPRING HOUSE, PA.

SOUTH

HEAVY CONSTRUCTION—BA

† **Tenn., Tullahoma**—CABLE TROUGHS, etc.—BA About 5/16—U. S. Eng., Tullahoma, furnish, install cable troughs and misc. electrical work for supersonic circuit of Propulsion Wind Tunnel, Arnold Engineering Development Center, Inv. ENG-40-126-56-47. CD 11/16/54.

BUILDINGS—BA

Ala., Guntersville—MUNICIPAL—BA 4/27—City, City Hall, steel, masonry, brick, limestone municipal bldg. $400,000. J. Martin Lide, 2919 Highland Ave., Birmingham, archt. CD 3/26.

BUILDINGS—SLC

N. C., Winston-Salem—PROFESSIONAL—Winston-Salem Professional Bldg., Inc., c/o Stinson, Arey, Hall, archts. 639-A W. 5 St., soon lets contract, professional Bldg.

HEAVY CONSTRUCTION—LB & CA

A. P. White & Assocs., 220 Latta Arcade, Charlotte, N. C. CA $114,630. water treatment plant, McCAIN, N. C. The North Carolina Sanatorium, McCain, N. C. Bids Jan. 20. CD 2/2, under LB.

Wm. B. Dillard Constr. Co., Sylva, N. C. CA $192,750. WW imprvs., water mains, water storage addns., water treatment plant addns., pressure filters, MURPHY, N. C. Town, L. L. Mason, mayor, Murphy, N. C. Garcia & Assocs., Inc., Peachtree Rd., Chamblee, Ga., engr.

Carper & Perreyclear, Orangeburg, S.C. CA $60,764, c.i. water mains, CRESCENT BEACH, S. C. Town, Crescent Beach, S. C. Bids Mar. 28. CD 3/23.

† **J. C. Critcher, Inc.,** P.O. Box 39, Asheville, N. C. LB $336,701. relocating U. S. Route 29, Hartwell Proj., Savannah River, Serial No. ENG-09-133-56-31, GEORGIA AND SOUTH CAROLINA. U. S. Eng., 200 East St., Julian St., P.O. Box 889, Savannah, Ga. Bids Mar. 20. CD 2/23.

Ebsary Foundation Co., 2154 N. W. North River Dr., Miami, Fla. LB $124,953. Contr. 27-B, Alton Road Bridge over Biscayne Waterway, Alton Rd. and Biscayne Waterway, 34 St., MIAMI BEACH, FLA. City, City Hall, Miami Beach, Fla.

Dist. P. Wks. Office, Bldg. No. 12, U. S. Naval Base, Charleston, S. C., cancelled bids to have been opened Apr. 19, sewerage sys. and sewage treatment plant, Navy Mine Defense Laboratory, NOy 91131, Spec. 49089, PANAMA CITY, FLA. CD 3/19.

† **Valley Constr. Co.,** Box 707, Columbus, Ga. LB $686,992. hangar, apron and parking apron, Tyndall Air Force Base, ENG-01-076-56-52, PANAMA CITY, FLA. U. E. Eng., 2301 Grant St., Mobile 7, Ala. Bids Mar. 27. CD 3/6.

Gregg Gibson & Gregg, 1016 N. Blvd., Leesburg, Fla. LB $221,776. Base Bid; $186,870. Alt. 1 lock, spillway, appurtenant work, Haines Creek near Lisbon on State Rd. 44, TAVARES, FLA. Bd. Comrs., Lake Co. Court House, Tavares, Fla. Gee & Jensen, Inc., 1174a S. Dixie St., West Palm Beach, Fla., engr.

▲ **ALABAMA**—State Hy. Dpt., Montgomery,

Ala.—Brown-Coble Constr. Co., Lexington, N. C. CA $1,838,892. c. conc. 5.639 mi. proposal A, U. S. 31, Jefferson Co.;

Ala.—A. E. Burgess Co., Inc., 3700 10 Ave. N., Birmingham, Ala. CA $886,717. grading, draining 8.576 mi. from Ala. 74, Marion and Winston Counties. Bids Mar. 16, awarded Apr. 2. CD 3/27, under LB.

Leo T. Barber, Moultrie, Ga. LB $674,606 (8 bidders) natural gas transmission and distr. sys. EUTAW, ALA. Greene-Hale Counties Gas Dist., Eutaw, Ala. Bids Mar. 28. CD 3/27.

▲† **McWilliams Dredging Co.,** Box 584, New Orleans, La. LB $1,095,192. (3 bidders) Whiskey Bay Pilot channel exten. dredging 6,678,000 cu. yd., St. Martin and Iberville Parishes, Inv. 56-203, LOUISIANA. U. S. Eng., foot of Prytania St., New Orleans, La. Bids Mar. 28. CD 3/16.

Boh Bros. Constr. Co., 2400 Cypress St., New Orleans, La. LB $176,301. furnishing, installing approx. 872 lin. ft. steel sheet piling along the 17 St. Canal St. West End, NEW ORLEANS, LA. Bd. Levee Comrs., Orleans Levee Dist., 200 Civil Courts Bldg., New Orleans, La. Bids Mar. 20.

BUILDINGS—LB & CA

Potter-Shackelford Constr. Co., 4 Washington Pl., Greenville, S. C. CA $100,000. PLANT Addn., FLETCHER, N. C. Cranston Print Works, Fletcher, N. C. CD 2/9, under LB.

George W. Kane, Jefferson Bldg., Greensboro, N. C. CA $350,000. married student APARTMENTS, REYNOLDA, N. C. Wake Forest College, Reynolda, N. C. Larsen & Larsen, Reynolda, N. C., archts. Bids Mar. 6.

L. S. Bradshaw & Sons, Salisbury, N. C. CA $353,200, general constr. Y.M.C.A. BLDG. and pool, SALISBURY, N. C. Salisbury Young Mens Christian Assoc., Salisbury, N. C., John R. Hartledge & John Erwin Ramsay & Assocs., Salisbury, N. C., archts. Bids Mar. 15.

Bradford Builders, Inc., 1101 Lincoln Rd., Miami Beach, Fla. LB $350,000. 30-unit "Island Towers" APARTMENT, 92 St. and E. Bay Harbor Dr., BAY HARBOR ISLANDS, FLA. Fox & Tarnopol, c/o Donald J. Reiff, archt., 600 Lincoln Rd., Miami Beach, Fla. Bids Mar. 27. CD 3/27.

(Continued on page 110)

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $44,000; other public works $73,000; industrial buildings $93,000; other buildings $344,000. Also Foreign projects of $100,000 and more in size of interest to American contractors.

By Regions & Classes of Construction
(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England	**Middle West**
Middle Atlantic	**West of Mississippi**
South	**Far West**
PROPOSED WORK	
Water Supply	**Public Buildings**
Sewers, Waste Disposal	**Mass Housing**
Bridges	**Commercial Buildings**
Streets & Roads	**Industrial Buildings**
Earthwork, Waterways	**Unclassified**

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.
BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.
SOON LETS CONTRACT: SLC
LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.
CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.

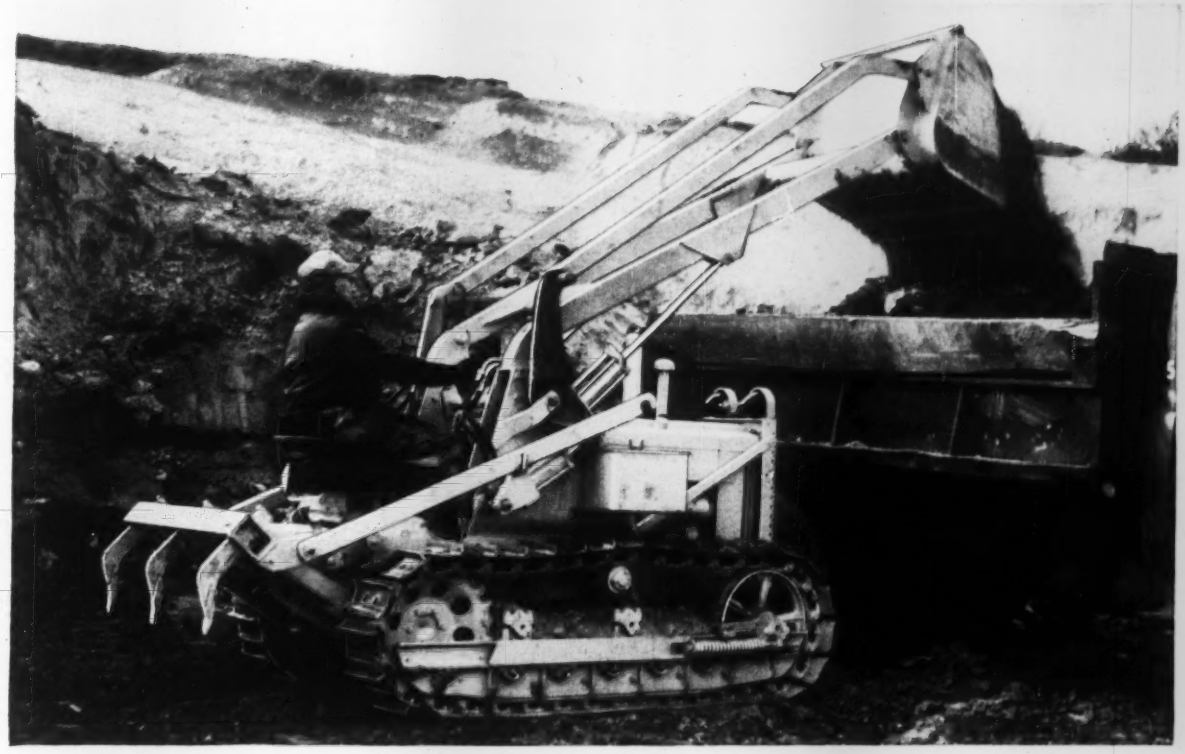
CD dates shown are of Construction Daily issue in which last previous report was published.

OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

†	**Federal Government**
▲	**Project of $1,000,000 or over.**
ENR	**Engineering News-Record**
CD	**Construction Daily**

For additional reports see Construction Daily.



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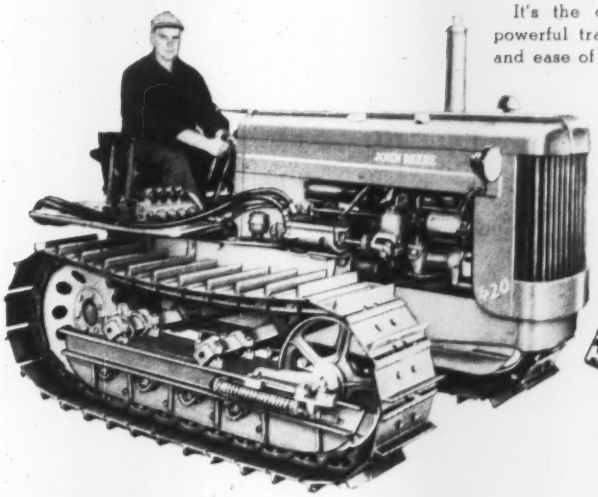

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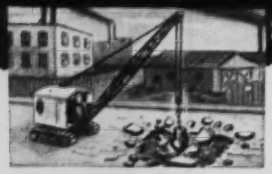

Frederick

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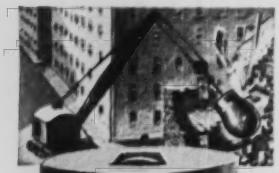

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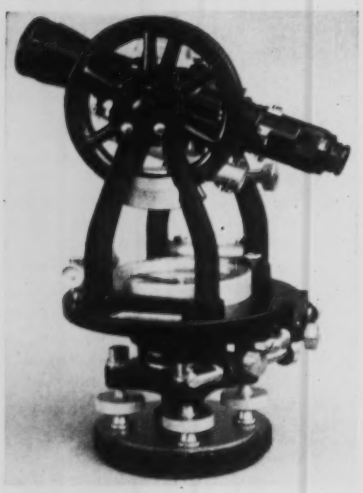

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(Continued from page 108)

MIDDLE WEST

HEAVY CONSTRUCTION—BA

INDIANA—TRAIL BLAZER SIGNS, etc.—BA 4/25—Indiana Toll Road Comn., 309 W. Washington St., Old Trails Bldg., Indianapolis,
Contract T.S.-2, trail blazer and incidental signs, consisting of furnishing materials, fabricating trail blazer signs, incidental warning signs, incidental information signs, timber sign supports and aluminum tripod sign supports and delivering signs and supports to La Grange Maintenance Bldg. (District No. 4) in La Grange Co., at intersection of Olney Rd. with Indiana (East-West) Toll Road. Plans deposit $3; adv. ENR 4/19. CD 2/10/54, under Streets and Roads.

HEAVY CONSTRUCTION—LB & CA

▲ **Bethlehem Steel Co.**, E. 3 St., Bethlehem, Pa., LB $3,220,000. (3 bidders) furnishing, fabricating 7,700 tons structural steel for Calumet Skyway Toll Bridge Proj., CHICAGO, ILL. City, City Hall, Chicago, Ill. Bids Apr. 3. CD 3/26.

Haines & Haines, 260 S. Main St., Elkhart, Ind., LB $214,423. water mains, MUNDELEIN, ILL. Village, Village Hall, Mundelein, Ill. Bids Mar. 12. CD 2/23.

Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago, Ill., CA, $119,850. steel water storage reservoir, MUNDELEIN, ILL. Village, Village Hall, Mundelein, Ill. Bids Mar. 12. CD 2/23.

BUILDINGS—LB & CA

W. H. Howard & Assoc., 978 Sunbry St., Columbus, O. CA $399,581, elementary SCHOOLS, NEWCOMERS TOWN, O. Bd. Educ., Newcomerstown, O. Awarded Apr. 2.

Irmscher & Sons, Inc., 1030 Osage St., Fort Wayne, Ind., LB Total est. $428,273. general contract Sunny Mede Grade SCHOOL, NEW HAVEN, IND. Bd. Educ., Paul Harding, supt., New Haven, Ind. LeRoy Bradley, 1115 S. Clinton St., Fort Wayne, Ind., archt.;
Henry Wehrenberg & Sons, Inc., 2725 N. Anthony St., Fort Wayne, Ind., LB concrete fdn. (New Haven, Ind.);
Shambaugh & Sons, 550 E. State St., Fort Wayne, Ind., LB plumbing and heating work (New Haven, Ind.);
McKay Electric Co., 3501 Quimby St., Fort Wayne, Ind., LB electrical work (New Haven, Ind.).

▲ **Crane Constr. Co.**, 201 E. Walton St., Chicago, Ill., LB $3,625,000, APARTMENT, Lakeshore Dr. and Division St., CHICAGO, ILL. Owner, c/o Hausner & Macsai, archts., 104 S. Michigan St., Chicago 3, Ill. Bids Mar. 23. CD 3/8.

▲ **Peter Nelson & Son, Inc.**, 115 S. 4 St., La Crosse, Wis., CA, Total est. $1,250,000. general contract ENGINEERING OFFICE, LA CROSSE, WIS. Trane Co., 206 Cameron Ave., La Crosse, Wis. Bids Mar. 16, CD 3/7;
George J. McKoskey, 2425 S. 16 St., La Crosse, Wis., CA, plumbing, heating, air-conditioning and ventilation work, (La Crosse, Wis.);
Clark-Bracken, Inc., 412 S. 4 St., La Crosse, Wis., CA, electrical work. (La Crosse, Wis.).

Good Housekeeping Shops, 1250 Library St., Detroit 26, Mich. Owner Builds. $307,000. WAREHOUSE, 6500 Davison St., DETROIT, MICH.

WEST OF MISSISSIPPI

HEAVY CONSTRUCTION—BA

† **Arkansas**—BA About 4/24—U. S. Eng., P.O. Box 867, Little Rock, bit. surf. Lead Hill access rd., public use area, Lead Hill, Bull Shoals Reservoir, Boone Co., CIVENG-03-050-56-36. CD 11/13/51.

Minn., Roseville (P.O. St. Paul)—BA 4/30—Village, F. L. Olson, clk., sanitary sewers from St. Paul city limits to County Rd. B. $700,000. Banister Eng. Co., 1549 University Ave., St. Paul, engr. CD 11/23.

† **Minnesota**—BA 5/1—U. S. Eng., 1217 U. S. Post Office & Custom House, St. Paul, Zone 1, reconstr. sills and apron Pokegama Dam, Mississippi River near Grand Rapids, CIVENG-21-018-56-59. CD 3/30.

† **Iowa, Sioux City**—ANG FACILITIES—BA On Or About 5/3—U. S. Eng., 1709 Jackson St., Omaha 2, Neb., Ang Facilities, Sioux City Air Force Base, ENG-25-066-56-81. CD 2/2/53.

† **Wyoming**—BA 5/15—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., Sch. Item 1, indicator, controls and accessories for gate hoist at outlet works Glendo Dam, Oregon Trail Div., Glendo Unit, Missouri River Basin Proj., Spec. DS-4674. L. N. McClellan, asst. comr. and ch. engr.

† **Colo., Colorado Springs**—SEWAGE TREATMENT PLANT—BA On Or About 6/12—Air Force Academy Constr. Agency, P.O. Box 1670, sewage treatment plant, Air Force Academy, IFB-05-613-56-20. CD 8/5/54.

BUILDINGS—BA

† **Tex., El Paso**—BACHELOR OFFICERS' QUARTERS—BA 5/2—U. S. Eng., P.O. Box 1538, Albuquerque, N. M., A401-64, three 3 story, 23,000 sq. ft., bachelor officers' quarters, 60-man and utilities, Fort Bliss. $500,000-$1,000,000. CD 9/29.

† **Tex., El Paso**—HEADQUARTERS BLDGS.—BA 5/23—U. S. Eng., P.O. Box 1538, Albuquerque, N. M., A401-7, eighteen approx. 2,578 sq. ft. each Bn headquarters bldgs., Fort Bliss. $500,000-$1,000,000. CD 9/29.

BUILDINGS—SLC

Neb., Omaha—GARAGE, etc.—Markel-O'Connell Motors, 6001 Military Ave., soon lets contract garage, shop

(Continued on page 112)

(*Advertisement*)

New Rotary Trowel enters field

"What we need is a really rugged trowel, one that can't get away from you and crack up", said one veteran concrete man when interviewed.

Because Stow Manufacturing Company, makers of concrete vibrators and screeds in Binghamton, New York, decided to make a Rotary Trowel, an exhaustive study was conducted to find out what concrete men wanted in a Rotary Trowel. Stow knew they were getting into a field where competitive manufacturers were well established, and that they had to come up with a machine that would be superior to any other on the market.

Thousands of dollars were put into the design and perfection of the Stow Roto-Trowel. The result: the G-34 Roto-Trowel; a rugged, safe, easy-to-handle machine that trowels smoothly.

Probably the most outstanding feature on the G-34 Roto-Trowel is the stationary guard ring, instead of the conventional rotating type. With the rotating type guard ring, the operator must be extremely careful whenever he works near walls and obstructions; if the ring should touch any object, it could wreck the trowel and injure the operator. With the Stow Roto-Trowel's strong stationary guard ring, the operator can trowel much closer to walls and obstructions with no fear of accidents.

Another feature is the fool-proof clutch control. This is a manually actuated clutch controlled by a lever on the handle. The instant the operator releases pressure on the handle, the blades stop rotating. The engine, however, continues to operate, thus eliminating the need to re-start the engine. This type clutch is an important safety feature of the Stow Roto-Trowel; and unlike centrifugal clutches, the engine can be started at full throttle. With this type of drive, the operator can throttle the trowel down from 100 RPM to 25 RPM where special conditions require slow speed.

THIS DEAD-MAN CONTROL on the wide crossbar of the handle immediately stops the machine, but not the engine, when it is released.

STOW ROTO-TROWEL FINISHING A SUPERMARKET FLOOR. Before trowelling, a Stow screed was used to strike-off the surface. By screeding and using a 1" slump concrete, the concrete set up so fast, they were able to put the Roto-Trowel on the job only 1 hour after screeding.

The Stow G-34 Roto-Trowel is powered by a 2½ HP gasoline engine which supplies ample power for even high slump concrete. The unit has an adjustable handle so the operator can set the height to his most comfortable operating position. This feature, plus the wider handle, makes the Roto-Trowel much easier to maneuver, regardless of the height of the operator.

On a construction job where one Stow Roto-Trowel was put in among competitive trowels, the contractor discovered that his trowel operators were actually arriving on the job early each day in order to use the Stow Roto-Trowel. They found it much easier to handle.

A hook mounted on top of the engine makes it easier to lift the Stow Roto-Trowel to higher levels. A knob on the handle controls blade pitch while the machine is running. All three blades fit into recessed slots to insure correct seating; each is secured by a hand-turned wing nut for quick changing. Float blades are 10 x 14 inches; finish blades are 6 x 14. Finish blades are made of the finest steel available, chrome vanadium, and can be reversed for double life.

The G-34 Roto-Trowel, complete with a set of float and finish blades, weighs 143 lbs. and is 34 inches in diameter.

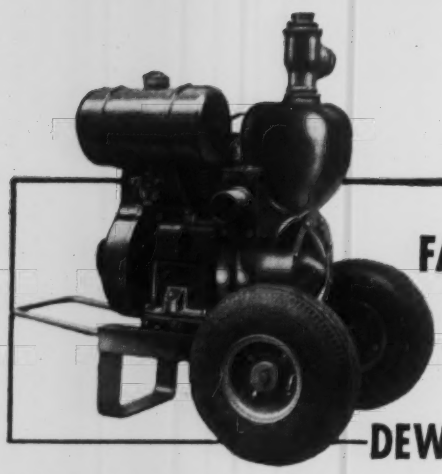
Stow now has a 24-inch model, the G-24, and a big 4-bladed 46-inch trowel, the G-46. A 34-inch electric trowel is also available with a 1½ HP motor.

Contact your nearest Stow Distributor for a demonstration, or write Stow Manufacturing Co., 19 Shear St., Binghamton, N. Y. Ask for Stow's complete catalog on Concrete Vibrators, Portable Concrete Grinders and Vibrating Screeds, and Rotary Trowels.

STOW MANUFACTURING COMPANY

19 Shear St. Binghamton, New York

Originators of the Flexible Shaft



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American Surety Company
Agents and Brokers Everywhere
100 Broadway, New York 5

(Continued from page 110)

and sales bldg. $100,000. J. F. Dunbar, Aquila Court, archt. CD 3/21.

Tex., Houston—HEATING & COOLING PLANT—Rice Institute, 6100 Main St., soon lets contract central heating and cooling plant, distr. sys., incl. new boilers and refrigeration equip. in existing central power plant and rehabilitate concrete tunnels and piping to serve new bldgs. $300,000. Lockwood, Andrews & Newman, 1010 Waugh St., engrs.

HEAVY CONSTRUCTION—LB & CA

† **MINNESOTA**—U. S. Forest Service, Dpt. Agriculture, 623 N. Second St., Milwaukee, Wis.:
Barnard-Curtiss Co., Phoenix Bldg., Minneapolis, Minn. LB $135,339 (6 bidders) grav. and crushed stone surf. Ball Club Lake Rd. 323 Sec. A, Cook Co. Bids Mar. 27. CD 3/15.

R. V. Leary Co., 937 5 St., Des Moines, Iowa, CA, $191,087, Sections II and III, sewage plant, CHARLTON, IOWA. City, Charlton, Iowa. Bids Feb. 27. Garden Eng. Service, Oskaloosa, engrs.;
Normoyle & Berg Co., 2223 11 St., Rock Island, Ill., CA $83,334. Section I (Charlton, Iowa.)

Concrete Materials & Constr. Co., 405 Granby Bldg., Cedar Rapids, Iowa, CA, $239,046, surf., TOLEDO, IOWA. Tama Co., Toledo, Iowa. Bids Mar. 21.

NEBRASKA—State Dpt. Roads & Irrigation, Lincoln, rejected bids Mar. 29, grading, detour, gravel, guard rail, subgrade, gran. subbase, shoulder, crushed rock, soil aggregate, & conc., Louisville-Syracuse, Weeping Water West and Avoca North, F-452, S-157 and S-682. CD 3/19.

Booth & Olson, Inc., 529 Insurance Exchange Bldg., Sioux City, Iowa, LB $73,988, street imprvs., OMAHA, NEB. Valley View Addition, Inc., 8725 Countryside Plaza, Omaha, Neb. Bids Mar. 24. CD 3/21.

OKLAHOMA—State Hy. Dpt., Capitol, Oklahoma City, Zone 5,
Okla.—**R. R. Tway, Inc.**, Box 3321, Oklahoma City 5, Okla. CA $252,216, est. $281,740 (8 bidders) bridge over north fork of Red River, State Hy. 6, Greer Co.;
Okla.—**J. H. Barton Co.**, 1916 N. Broadway, Oklahoma City, Okla., CA $157,860, est. $173,111 (11 bidders) four bridges on US 66, just west of the Wagoner Co. line, Rogers Co. Bids Apr. 3, awarded Apr. 4. CD 3/27 and 3/23.

▲ **OKLAHOMA**—State Hy. Comn., Capitol, Oklahoma City, Zone 5,
Okla.—**Simms Constr. Co.**, Duncan, Okla., CA $84,625, est. $110,223 (8 bidders) grade, drain and one bridge 6,998 mi. State Hy. 54, at Foss, Washita Co.;
Okla.—**Park Ward Co.**, Commerce Exchange, Oklahoma City, Okla., CA $90,150, est. $89,973 (3 bidders) grade, drain, soil cement base 3.823 mi, county road at Henryetta, Okmulgee Co.;
Okla.—**Standard Industries**, 2119 E. 11 St., Tulsa, Okla., CA $403,517, est. $472,293 (7 bidders) grade, drainage 3.711 mi. US 66 at Catoosa, the Wagoner Co. line, Rogers Co.;
Okla.—**Worth Constr. Co.**, 300 Greenleaf St., Fort Worth, Tex., CA $513,484, est. $541,285 (4 bidders) c. conc. 5.211 mi. US 270, west of Wewoka, Seminole Co.;
Okla.—**Jack Briscoe**, Stillwater, Okla., CA $695,712, est. $697,303 (3 bidders) c. conc. 5.273 mi. US 77, south of Newkirk, Kay Co.;
Okla.—**Austin Contg. Co.**, 1000 Singleton Blvd., Dallas, Tex., CA $324,674, est. $326,437 (5 bidders) stabil. aggregate base with b. conc. surf. 4.74 mi. Hy. 77, Murray Co.; CA $323,298, est. $326,323 (5 bidders) stabil. aggregate base with b. conc. surf. 5.116 mi. Hy. 77, Davis Co.;
Okla.—**Jack Durett**, Keota, Okla., CA $289,288, est. $347,956 (12 bidders) stabil. aggregate base, rock asph. surf. and bridge 0.776 mi. Hy. 89 at Ringling, Jefferson Co. Grand total $2,724,748. Bids Apr. 3, awarded Apr. 4. CD 3/23.

City, Muskogee, Okla. rejected bids Mar. 28, water distr. sys. extens., MUSKOGEE, OKLA. LB $318,440, est. $310,000. CD 3/12.

A B C Constr. Co., 4423 S.W. 33 Ave. W., Tulsa, Okla. CA $589,000, WW55-3, 20,500 ft. 36 in. concrete water pipe, TULSA, OKLA. City, City Hall, Tulsa, Okla. Bids Mar. 16, awarded Mar. 27. CD 3/28, under LB.

Admiral Paving Co., 7160 E. Admiral St., Tulsa, Okla. CA $91,428, est. $93,000, widen Katy underpass on N. Denver Ave.; CA $262,324, est. $270,000, widen Frisco underpass on N. Denver Ave., TULSA, OKLA. City, City Hall, Tulsa, Okla. W. R. Wooten, Tulsa, Okla., city engr. Awarded Apr. 3. CD 3/5/52.

Bowie-Cass Electric Co-operative, Douglasville, Tex. Own Forces. $275,000, rural distr. lines, sys. imprvs., Bowie and Cass Counties, TEXAS. CD 12/9.

Galveston County Water Dist., c/o Eddie Winkler, Dickinson, Tex. Own Forces. $50,000. some outlying water mains, DICKINSON, TEX.

Galveston County Water Dist, c/o Eddie Winkler, Dickinson, Tex. Own Forces. $75,000, some outlying sanitary sewer lines, DICKINSON, TEX.

Dusek Constr. Co., Rosenberg, Tex. LB $95,521. clearing and excavation work along 12 mi. Dry Creek in Smithers Lake area, RICHMOND, TEX. Fort Bend Co., Geo. G. Roane, judge, Richmond, Tex. Bids Mar. 27.

† **U. S. Eng.**, Fort Peck, Mont., rejected bids Feb. 29, modification for control shaft, Tunnel No. 4, Fort Peck Dam and Reservoir Proj. Inv. 24-016-56-24, MONTANA. CD 12/29.

Robert A. Fender, 2660 G. Road, Grand Junction Colo., CA $146,260. 60x165 ft. municipal swimming pool, 3,000 sq. ft. brick, glazed tile bath house, GRAND JUNCTION, COLO. City, City Hall, Grand Junction, Colo. Bids Mar. 28, awarded Mar. 30. CD 3/21.

(Continued on page 115)

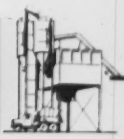
gets job 21 miles from base and makes it pay...batches at job site with Noble-Mobile

Noble-Mobile at site of new Crown-Zellerbach plant, Antioch, Calif. 10" wheels dismounted for use on truck mixers. Supplier: H. W. "Heine" Gentry Co., Walnut Creek, Calif.

Hauled along highway like semi-trailer • Set up in one day—no field wiring, footings or crane time required on base plant • Aggregates charged with front end loader, crane or conveyor • Bulk cement utilized ...batched automatically • Excellent quality control Maximum production from mixer trucks—short hauls, more yards per day • Production capacity 60 to 100 yards per hour • Covered by patents pending

NOBLE BATCHING PLANTS

Portable, semi-portable or stationary plants designed and built by Noble Company · 1860 · 7th St., Oakland 20, Calif. TEmplebar 2-5785



Other Noble Company offices: 20950 Center Ridge Road, Cleveland 16, Ohio. EDison 1-3426.
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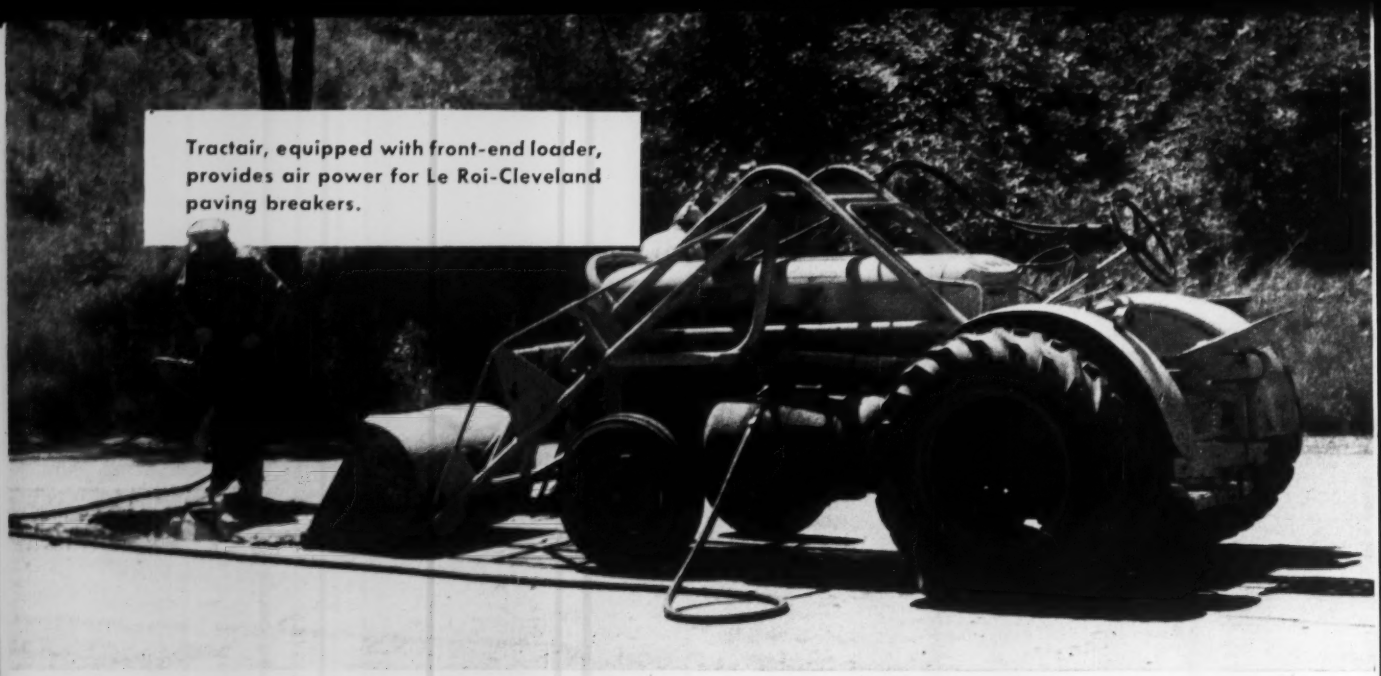
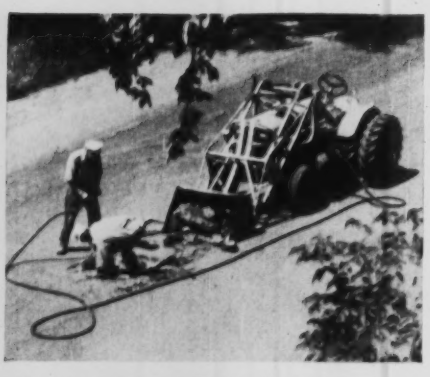


Tractair, equipped with front-end loader, provides air power for Le Roi-Cleveland paving breakers.

Combination Tractor-Compressor Unit Works 8-hour Day, All Year Long

One Le Roi Tractair (combination tractor-compressor unit) can do the work of several specialized machines — plus supplying 125-cfm air power for a wide variety of air tools. Because Tractair is a combination 42-hp wheel tractor and a dependable air compressor, here's what can happen on your jobs — in one day — using just one of the many Tractair attachments available:



Broken concrete is loaded out by the Tractair with front-end loader attachment.

Backfill blade easily replaces Tractair front-end loader bucket for light-grading work.

7:00 A. M. Tractair, equipped with a front-end loader, arrives at the job site. Le Roi-Cleveland pavement breaker powered by the Tractair's 125-cfm air compressor breaks concrete.

7:56 A. M. With the front-end loader attachment, the Tractair loads out broken concrete from the trench site.

8:39 A. M. Le Roi-Cleveland clay spades, powered by the Tractair compressor, trim up the excavation for pipe laying.

9:58 A. M. The operator drives the Tractair to another job to provide power for pumping out a water-filled trench.

11:00 A. M. Returning to the first job, the Tractair fills in the trench with its front-end loader.

11:30 A. M. The Tractair compressor provides air power for Le Roi-Cleveland tampers to compact the trench fill.

1:00 P. M. Using the front-end loader attachment, the Tractair loads out excess dirt into a truck.

1:20 P. M. The self-propelled Tractair proceeds to another job site and provides air power for rock drilling.

2:42 P. M. After rock has been blasted out, the Tractair 125-cfm air compressor provides air power for Le Roi-Cleveland breakers to trim up the hole.

4:05 P. M. With the crane boom on the front-end loader, the Tractair lifts and lowers heavy pipe into the trench.

4:45 P. M. The Tractair loads out debris to leave the work area clean and safe.

Yes, the Le Roi Tractair can give you performance like this around the clock — on all of your jobs. Applications are unlimited with Le Roi Tractair attachments. For example, the front-end loader attachment has many quick-change accessories — utility platform, fork lift, straight backfill blade, combination bucket and crane boom, crane lift, and several snow removal tools. Other attachments for the Le Roi Tractair are the backhoe, earth auger, rotary sweeper, backfill blade, snow blades, and many more.

Le Roi Division of Westinghouse Air Brake Co., Milwaukee 1, Wis. also manufactures portable and stationary air compressors, air tools, and heavy-duty engines. Write today for information about any of these products.

T-49

(Continued from page 112)

BUILDINGS—LB & CA

Joint Comm. for Public Bldgs. of Fridley and School Dist. No. 23 of Anoka Co., M. Marcucci, clk., Fridley, Minn., cancelled bids to have been opened Mar. 29, MUNICIPAL BLDG. and HIGH SCHOOL, FRIDLEY, MINN. CD 3/8.

▲ Standard Constr. Co., Builders Exchange Bldg., Minneapolis, Minn. CA $1,050,000, general constr. HIGH SCHOOL, WORTHINGTON, MINN. Bd. Educ., V. E. Brown, clk., Worthington, Minn. CD 3/14, under LB.

Fairbanks-Morse & Co., 9th and Harney Sts., Omaha, Neb. CA $256,112, POWER PLANT extens., incl. generating equip., building changes, cooling sys., electrical work, OXFORD, NEB. City, Oxford, Neb. Bids Mar. 19. CD 3/5.

Berry & Floyd Davis Co., Reserve Loan Life Bldg., Dallas, Tex. Own Forces. $347,075, 25 DWELLINGS in Richardson Heights; $376,100, 30 DWELLINGS, Walnut Hills, DALLAS TEX. CD 2/3.

Longhorn Constr. Co., 9620 John West Rd., Dallas, Tex. Own Forces. $344,000, 17 DWELLINGS; $356,610, 24 DWELLINGS, DALLAS, TEX. CD 1/31.

▲ Cato Corp., c/o C. Grady Cates, Jr., 9747 Harry Hines Blvd., Dallas, Tex. Own Forces. $379,615, 43 DWELLINGS; $344,900, 27 DWELLINGS; $359,150, 30 DWELLINGS, FARMERS BRANCH, TEX. Grand Total $1,083,665. CD 12/2.

Garden Oaks Building & Realty Co., c/o P. S. Luttrell, 3205 N. Shepherd St., Houston, Tex. Own Forces. $356,500, 24 HOMES, HOUSTON, TEX. CD 2/29.

▲ United Lumber & Building Co., c/o A. A. Sage, 2054 Brentwood St., Houston, Tex. Own Forces. $368,150, 30 DWELLINGS; $396,600, 33 DWELLINGS; $349,175, 25 DWELLINGS, HOUSTON, TEX. Grand total $1,123,925. CD 1/30.

John B. Brown, Builder, 7026 Lawndale St., Houston, Tex., CA $352,218, 28 frame, masonry DWELLINGS, HOUSTON, TEX. CD 2/1.

▲ Texas Gulf Constr. Co., Inc., Box 661, Houston, Tex. LB $1,402,000, two girls' DORMITORIES, HOUSTON, TEX. Rice Institute, 6100 Main St., Houston, Tex. Bids Mar. 29. CD 3/14.

Lewis O. Tyra, c/o Tyra Lumber Co., 5519 Lawndale St., Houston, Tex. Own Forces. $365,200, 36 DWELLINGS; $347,500, 30 DWELLINGS, LA-MARQUE-TEXAS CITY, TEX.

H. T. Williams Co., c/o C. E. Anderson, City Natl. Bank Bldg., Houston, Tex. Own Forces. $355,000, 14 masonry DWELLINGS; $368,500, 18 DWELLINGS, NEDERLAND, TEX. CD 2/2.

FAR WEST

HEAVY CONSTRUCTION—BA

Calif., Los Angeles—BA 4/27—Drainage District No. 9, 2250 Alcazar St., rein.-conduit in La Canada Verde Creek, Whittier. $300,000. H. E. Hedger, c/o owner, engr. CD 10/19.

▲ Ore., Portland—BA 5/1—Multnomah Co., Court House, superstructure for Morrison St. Bridge. $2,000,000. Paul C. Northrop, c/o owner, engr. CD 8/18/54.

† Idaho—BA 5/3—Office of Proj. Constr. Engineer Bureau Reclamation, Dpt. Interior, Rupert, laterals from Group 7 wells, North Side Pumping Div., Minidoke Proj., Spec. 1005-242.

HEAVY CONSTRUCTION—LB & CA

† W. W. Clyde & Co., Springville, Utah, LB $894,576, est. $917,419, (5 bidders) earthwork, concrete pipe lines, structures and concrete or steel pipe for trunk lines, Station 934 plus 98 to Station 1144 plus 60, Davis Aqueduct, Weber Basin Proj., Spec. DC 4458, UTAH. Bureau Reclamation, Dpt. Interior, Ogden, Utah. Bids Apr. 3. CD 2/29.

† Nelson Bros. Constr. Co., 347 W. 16 South, Salt Lake City, Utah, LB $147,529, est. $159,590, East Bountiful pumping plant and South Davis pumping plant, Weber Basin Proj., Spec. DC 4616, UTAH. Bureau Reclamation, Dpt. Interior, Ogden, Utah. Bids Apr. 3. CD 3/1.

Snohomish County Public Utility Dist., Everett, Wash., Day Labor, $650,000, 50,000 kw. sub-station, EVERETT, WASH.

Gail Zysset, Salem, Ore., LB $48,935, (9 bidders) install 18,000 lin. ft. 16 in. water pipe, HOOD RIVER, ORE. City, City Hall, Hood River, Ore. Bids Mar. 29. CD 3/14.

▲ CALIFORNIA—State Div. Hys., 1120 N St., Sacramento,

Madonna Constr. Co., P. O. Box 910, San Luis Obispo, Calif., LB $1,777,164, (7 bidders) grading, paving 7.1 mi. U.S. 101 and constr. 3 rein.-con. bridges for 4-lane route between Hourihan Grade and Russell Turn, San Luis Obispo Co. Bids Apr. 4. CD 3/8.

BUILDINGS—LB & CA

▲ W. H. Shields Constr. Co., 252 Taylor St., Eugene, Ore., CA $1,202,552, HIGH SCHOOL, LEBANON, ORE. Lebanon School Dist., Lebanon, Ore. Awarded Mar. 30. CD 3/23, under LB.

CANADA

BUILDINGS—BA

▲ Alta., Edmonton—ADMINISTRATION—BA 4/26—Defence Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont., 3 story, part bsmt., 140x400 ft., rein.-con. frame, brick walls, administration bldg. at Griesbach Army

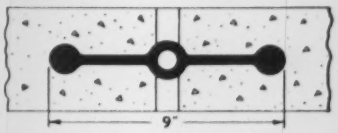
Water Leakage Problems IN CONCRETE STRUCTURES?

—Specify and use Servicised

RUBBER WATERSTOP

HOLLOW BULB—FOR EXPANSION JOINTS

Insures permanent, watertight seals in joints where considerable movement due to expansion and contraction is expected. Flexible and elastic with a very high degree of tensile strength to withstand both lateral and shearing movement. Widths—6" and 9" . . . lengths to order.



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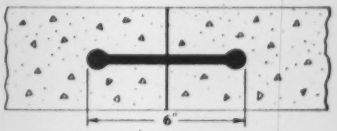
Made of durable, elastic cured rubber which has high tensile strength and flexibility for effective sealing of contraction and expansion joints against hydrostatic pressure. Carefully manufactured to insure dense, homogeneous cross section for greatest service life. Widths—6" and 9" . . . lengths to order.



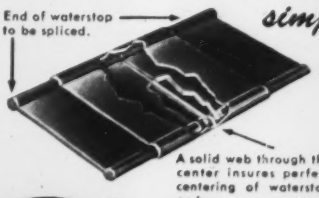
SPLIT TYPE WATERSTOP

faster, easier installation

A new Servicised development already in wide use because it reduces installation time and cost by eliminating splitting of form. One half of width is split to permit fastening to inside of bulkhead in the form of a "T." After section is poured, form is removed and divided sections are joined together by stapling. Pat. Pend.

WATERSTOP UNION

simplifies Field Splicing



Permits a faster, simpler method of field splicing, using only rubber cement. The union is hollow and is made from rubber meeting the same specifications as the waterstop. Available for splicing 6" and 9" Dumbbell and 6" and 9" Hollow Bulb Waterstops. Pat. Pend.

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TAPECOAT is the widely-accepted alternate material that is equivalent to mill-applied hot coal tar protection. With this easy-to-use material, protection can be applied in the field by your own men, because technical know-how, kettles and special crews are not required. You save time and money while providing the long-life protection called for.

TAPECOAT is easily applied, using a torch to soften or bleed the pitch which gives both bond and protection. Available in widths from 2" to 24", it is spirally wrapped or cigarette wrapped around pipe, pipe joints, couplings, conduit, cable, and insulated piping.

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Originators of Coal Tar Coating in Tape Form

1551 Lyons Street
Evanston, Illinois

Barracks. $1,250,000. K. Stanley & Assocs., 618 Northern Hardware Bldg., archts. CD 1/5.

BUILDINGS—SLC

▲ **Que., Montreal**—OFFICE—Montreal Life Insurance Co., 625 Burnside Ave., soon lets contract 8 story, two bsmt., rein.-con., stone office bldg. Over $1,000,000. Barott, Marshall, Montgomery & Merrett, Canada Cement Bldg., Montreal, Que., archts. Lindley Shector, c/o archts., engr. CD 5/19/52.

HEAVY CONSTRUCTION—LB & CA

Gulf Maritime Constr. Ltd., 50 Soucy St., Matane, Que. LB $146,860, (3 bidders) harbor imprvs., ENGLEE, NEWFOUNDLAND. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Mar. 28. CD 3/13.

Cameron Contg. Ltd., 77 Upper Water St., Halifax, N. S., LB $212,217, (1 bidder) wharf and breakwater in harbor development proj., LONG POND, NEWFOUNDLAND. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Mar. 28. CD 2/29.

ONTARIO—Dpt. Hys., Parliament Bldgs., Toronto, Ont.—**L. H. Owens,** Box 407, 185 11 Ave., Cochrane, Ont., CA, $75,397, three creosoted timber bridges over Valentine River, Ford Creek and Skunk River, Cochrane, Contract 55-606;

Ont.—**W. D. Laflamme Ltd.,** 51 Richer St., Hull, Que., CA, $79,221, (5 bidders) railway overhead on Hy. 401, Kingston, Contr. 55-607;

Ont.—**Domex Co. Ltd.,** 1290 Bay St., Toronto, Ont., CA, $134,488, railway overhead on Hy. 401. Contract 55-605, Kingston;

Ont.—**Mombray Constr.,** Wingham, Ont., CA, $114,327. (8 bidders) 2 bridges, grading approaches Hy. 87 at Maitland River and Maitland River overflow, Stratford, Contract 55-603. Awarded Mar. 29. Grand total $403,433.

James Kemp Constr. Ltd., Box 52, Station "B", Hamilton, Ont., CA, $761,832, sewage treatment plant, KINGSTON, ONT. City, City Hall, Kingston, Ont. Bids Mar. 23, awarded Mar. 27. CD 3/1.

North Shore Constr. Co. Ltd., 660 St. Catherine St. W., Montreal, Que., LB $73,377, (13 bidders) breakwater reconstr., PORT HOPE, ONT. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Mar. 28. CD 3/12.

Standard Lime Co., Ltd., 1595 St. Gregoire St., Montreal, Que., CA, $440,750, supplying aggregates for St. Lambert Lock in Lachine Section of St. Lawrence Seaway, QUEBEC. St. Lawrence Seaway Auth., No. 2 Temporary Bldg., Ottawa, Ont. Awarded Mar. 29. CD 8/8.

▲ **Atlas-Winston Ldt.,** c/o Atlas Constr. Co., 4781 St. Catherine St. W., Montreal, Que., CA $3,479,750. first stage constr. of Lower and Upper Beauharnois Locks and approaches, part of St. Lawrence Seaway Proj., QUEBEC. St. Lawrence Seaway Auth., No. 2 Temporary Bldg., Ottawa, Ont. Bids Mar. 27, awarded Mar. 29. CD 3/5.

George A. Steele, New Carlisle, Que., LB $122,759, (11 bidders) breakwater-wharf, PERCE, QUE. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Mar. 28. CD 3/13.

Tracy Constr., Inc., 905 4 Ave., Tracy, Que., LB $610,696, (17 bidders) wharf reconstr. and exten., Quebec Harbor, QUEBEC CITY, QUE. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Mar. 14. CD 2/29.

Dionne & Canuel, Ulric, Que., LB $421,898, (9 bidders) wharf reconstr., RIVIERE AU TONNERE, QUE. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Mar. 28. CD 3/13.

BUILDINGS—LB & CA

▲ **Con-Eng Constr. Co.,** 266 Dundas St., London, Ont., CA Est. $1,150,000. 125x140 ft., supermarket as first unit of SHOPPING CENTER, LONDON, ONT. Wharncliffe Realty Syndicate, Milton Cohen, 467 Regent St., London, Ont. Grand Union Carroll Grocery, lessee. Awarded Apr. 2.

PROPOSED PROJECTS

WATER SUPPLY

Ala., Russellville—Waterworks & Sewer Bd. City, City Hall, 2 m.g. filter plant, 2 m.g. steel storage reservoir, 175-acre lake for water supply, 60x850 ft. earth dam, 4½ mi. 16-in. c.i. water mains, etc. $750,000. J. E. O'Toole, Watts Bldg., Birmingham, consult.-engr.

▲ **Calif., Oakland**—Alameda Co. Court House, voted $4,290,000 bonds, water system, incl. reservoirs, distribution mains, etc. CD 2/27.

▲ **Mo., Maryville**—City, defeated $1,100,000 bonds Mar. 27, water sys. expansion, imprvs. $1,037,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., engrs.

Tex., Bryan—City, 8 mi. water pipe line from Wellfield north of town to city limits, $550,000; 2 addnl. water supply wells, $80,000; 2nd elevated steel water storage tank, $85,000. CD 11/10.

SEWERS, WASTE DISPOSAL

▲ **Calif., Santa Ana**—Orange Co., Court House, $42,000,000 bond election June 5, flood control system. Harrison & Woolley, 308 W. 5 St., Santa Ana, consult. engrs.

Conn., Windsor Locks—Town, Town Hall, sanitary sewers in Southwest Section $531,500; storm sewerage sys. Southwest area, $315,000.

▲ **N. J., Secaucus**—Town, Town Hall, sewerage sys. and sewage plant. $3,000,000. Homer O. Smith, 1 Plank Rd., consult.-engr. Bids in October. CD 12/9/53.

▲ **Tex., Austin**—City, City Hall, sanitary sewers, $4,750,000; storm sewers, $1,500,000.

▲ **Tex., Bryan**—City, sewage disposal plant, $200,000; storm sewers, $300,000; sanitary sewers, $1,500,000.

▲ **Tex., Fort Worth**—City, City Hall, sanitary sewer collection main in North Side. $1,000,000. Carter & Burgess, 815½ Throckmorton St., consult.-engrs. CD 2/8.

▲ **Tex., Grand Prairie**—City, defeated bonds Mar. 21, sewage disposal unit, $1,500,000; sanitary sewer collection lines, $200,000. Homer A. Hunter, 3708 Abrams Rd., Dallas, archt. (Correction status). CD 3/28.

Tex., Odessa—City, sewage treatment plant. $750,000. Parkhill, Smith & Cooper, 201 Avenue R, Lubbock, consult. engrs. CD 3/28.

▲ **W. Va., Huntington**—Huntington Sanitary Bd., City Bldg., sewage collection and treatment sys. $8,500,000. The Chester Engineers, 210 E. Park Way, Pittsburgh, Pa., consult. engrs. CD 11/10/54.

BRIDGES

▲ **Calif., Long Beach**—City, 205 Broadway, 2 rein.-con. open cut vehicular overpasses, Spring St., and Lakewood Blvd., Long Beach Municipal Airport. $3,000,000. Moffatt & Nichol, Inc., 122 W. 5 St., consult. engr. CD 7/7/53.

▲ **Ill., Chicago**—Cook Co., County Bldg., Northwest Expressway bridge over North Branch Chicago River linking Ohio-Ontario Sts. with North, West and South Expressways, $4,800,000. Berryman Peterson & Shur, 130 N. Wells St., consult. engrs. CD 11/3/49.

▲ **Ky., Louisville**—City, City Hall, Sixth and Jefferson Sts., railroad grade separation at 15 and Magnolia Sts., $800,000; railroad grade separation at Seventh and Mix Sts., $650,000, W. W. Sanders, city engr.

▲ **MARYLAND**—State Rds. Comn., 108 E. Lexington St., Baltimore, Zone 2,

Washington Co.—elimination of grade crossings in Hagerstown. $6,000,000. Penna. R. R., West Maryland Ry. and city of Hagerstown will contribute to cost. A. L. Grubb, ch. engr.

Que., Drummondville—City, City Hall, Drummondville, and Canadian National Rys., A. V. Johnston, ch. engr. Montreal, Que., viaducts on Heriot, Lindsay and Brock Sts. $750,000.

STREETS AND ROADS

▲† **COLORADO**—Bureau P. Rds., Dpt. Commerce, Bldg. 40, Denver Federal Center, Denver,

Clear Creek Co.—grading, base 6.1 mi. Mt. Evans Highway, Colo. Proj. 5403, Idaho Springs, $400,000.

Custer Co.—grading 3.6 mi. Green Horn Hy. Proj. 351I, Rye, $460,000.

Delta Co.—grading, base 2.5 mi. Colo. 13-D, Mesa and Cedaredge, $250,000.

Montezuma Co.—grading, base for approaches 3.5 mi. to tunnel at Mesa Verde Park, Colo. Proj. 1F, Cortez, $350,000.

Rio Blanco Co.—grading 5.7 mi. Colo. Proj. 16D, Marvine-Phippsburg, $525,000. K. S. Chamberlain, div. engr. Work in 1957.

▲ **Mich., Grand Rapids**—Bd. Rd. Comrs. Kent Co., County Bldg., primary road constr.; local roads; wid'n., drainage, traffic signals, $1,523,500, Otto Hess, ch. engr. CD 2/25/54.

Mich., Marshall—Bd. Rds. Comn., Calhoun Co., County Bldg., 38 mi. blacktopping; 8 mi. recapping; 45,000 lin. ft. curb and gutter; 11,000 tons blacktopping. $600,000. Arthur Arndts, co. engr. CD 5/17/54.

▲ **OHIO**—State Hy. Dpt., Columbus, Zone 15,

Lake Co.—Lakeland Freeway, 1st stage relocation of 2.88 mi. Rte. 20 north of present location Mentor. $1,200,000, Michael Baker, Rochester, Pa., consult. engr.

▲† **WYOMING**—Bureau P. Rds., Dpt. Commerce, Bldg. 40, Denver Federal Center, Denver, Colo.,

Fremont Co.—grading, base course 2.86 mi. Riverton gas hills roads, Atomic Access A-AA 7 (1), Riverton, $200,000.

Teton Co.—base, bit. surf. and bridge 1.7 mi. West side Hy., Wyo. Proj. 3A, Jackson, $700,000;

base course, bridge Snake River Canyon 3.1 mi. Wyo. Proj. 6F, Jackson, $335,000.

Washakie Co.—grading 3.2 mi. Buffalo-Tensleep, Wyo. Proj. 10-C-6, Buffalo, $400,000.

Yellowstone Park—bit. surf. 3.5 mi. Norris Canyon Cutoff, Yellowstone Proj. 12A, $75,000.

bit. surf. 114 mi. Grand Loop Hy., Wyo. Proj. West Yellowstone 1F1 and 1F2, $600,000. Work in 1957. K. S. Chamberlain, div. engr.

EARTHWORK, WATERWAYS

Conn., Hartford—City, City Hall, engines, gear units and other items for South & North Meadows Pumping Stations for flood control. $828,000. Winfred W. DeMay, city engr. CD 7/18/45.

AIRPORTS

▲† **Tex., San Antonio**—COMMUNICATIONS BASE SHOP—U. S. Eng., Box 1229, Galveston, plans by Addis E. Noonan Assocs., and Jerry Rogers, archts.-consult. engrs., 2002 N. St. Marys St., Box 8308, communications base shop, FM, general purpose, Brooks Air Force Base. $5,000,000. CD 10/19/54.

▲† **Tex., San Marcos**—HOUSING—Office of Purch. & Contg. Officer, Edward Gary Air Force Base, plans by O'Neil Ford & Assocs., 528 King William St., San Antonio, 215 unit housing. $1,720,000. CD 1/17.

LATIN AMERICA

▲ **Cuba, Havana**—PLANT—Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron 17, O., U.S.A., plans tire plant, $4,000,000.

(Continued on page 118)

GOFF KIRBY READY MIX COMPANY DISPATCHES TRUCKS BY RADIO, SAVES MONEY ON HAULING

Cleveland, Ohio Firm Operates 70 Trucks From Four Plants — Finds General Electric 2-Way Radio Helps Keep Costs Down!

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32 Trucks Have G-E Radio!

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Radio Helps Keep Hauling Costs Down!

Edwin Harper, Goff Kirby president, reports that most of the cost of concrete is in the hauling charges. Typical rental of a concrete truck in his city is $11.50 per hour. By eliminating truck waiting time and driver overtime you save money. General Electric 2-way radio helps keep these costs down.

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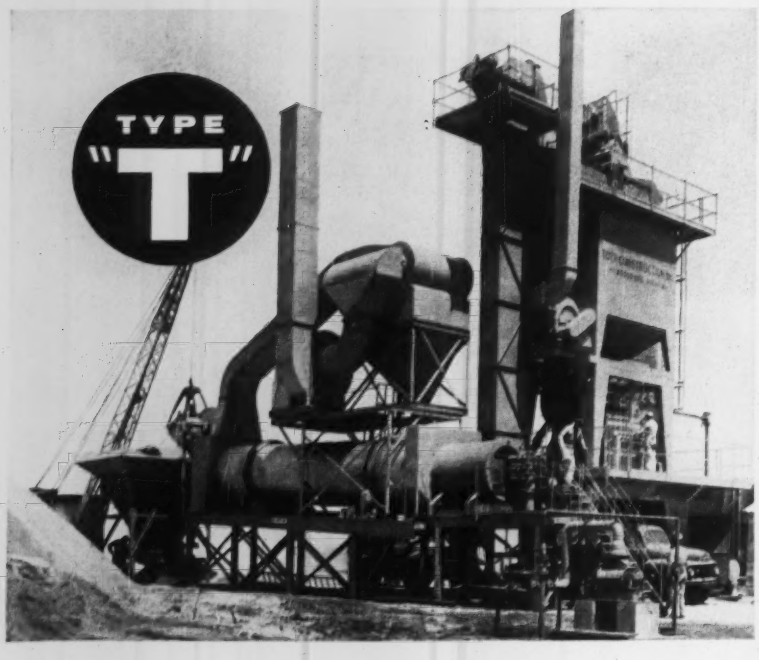
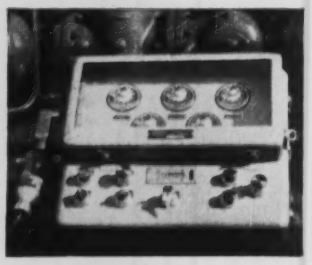


Now Available With Automatic Cycle Control



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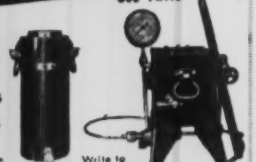

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(Continued from page 116)

▲ Ecuador, Quito—THERMAL POWER PLANT—Empressa Electricia, Quito, S. A., constr. 3,000 kw. thermal power plant at Quito; 14,480 kw. hydroelectric plant at Cunucyacu on San Pedro River and 15½ mi. transmission line to bring 1,500 kw. of power from Machachi. Project also includes replacement of distr. sys. and imprvs. and expansion. $9,000,000.

PUBLIC BUILDINGS

▲ Ala., Eufaula—HOUSING—City, City Hall, 150-low rent homes. $1,600,000. Work this year.

Ark., El Dorado—AUDITORIUM—City, City Hall, voted bonds, municipal auditorium, $500,000. E. K. Williamson, city engr.

▲ Calif., Chico—SCHOOL—Chico City Elementary & Chico City High School Dist., Chico, voted bonds, Hooker Oak, Sierra View, Citrus and Oakdale Schools addns., new junior high school and Chico Junior High School addn. $1,460,000. Lawrence G. Thompson, 125 W. Third St., Chico, archt.

▲ Calif., Huntington Beach—SCHOOLS—Huntington Beach Union High School Dist., Huntington Beach, defeated $2,750,000 bonds, schools. CD 2/7.

Calif., La Mesa—SCHOOLS—La Mesa-Spring Valley Elementary School Dist., La Mesa, voted $960,000 bonds, schools: CD 1/9.

▲† Calif., Long Beach—HOSPITAL—Veterans Admin., Munitions Bldg., Wash., D. C. 2nd phase, hospital modernization $12,000,000. CD 5/18.

▲ Calif., Manhattan Beach—SCHOOL—South Bay Union High School Dist., 207 Francisca Ave., Redondo Beach, plans by Flewelling & Moody, 766 Colorado Blvd., Los Angeles, Aviation High School. $1,300,000.

Calif., Pomona—SCHOOL—Pomona Unified School Dist., Admin. Bldg., 605 N. Park Ave., plans by Randall & Yinger, 34 1W. Orange Grove Ave., elementary school. Under $500,000. CD 3/19.

Colo., Colorado Springs—HOSPITAL—Memorial Hospital, Colorado Springs, 3 story hospital addn. $600,000.

▲ Colo., Golden—SCHOOL MINES—State of Colorado, Colorado School of Mines, Golden, two academic quadrangle studies, dining commons, research and graduate study, auditorium and student union bldg., married student housing bldgs. for geophysics, mining basic sciences and engineering, $20,000,000. Pereira & Luckman, 9220 Sunset Blvd., Los Angeles, Calif., consult. engrs.-archts. (Correction—architects-address). CD 2/29.

Conn., Bloomfield—SCHOOL—Town Bd. Educ., plans by Jeter D. Cook, 36 Pearl St., Hartford, Wintonbury Elementary SCHOOL. $500,000. Robert W. Loomis, 32 Maple Ave., Windsor, consult. engr. Henri B. Van Zelm & Assoc., 1007 Farmington Ave., West Hartford, engrs. CD 1/11.

Conn., Derby—HOUSING—State P. Wks. Dpt., 165 Capitol Ave., Hartford, moderate rental housing. $605,000. P. J. Carroll, c/o owner, engr.

Conn., East Hartford—HOUSING—State P. Wks. Dpt., 165 Capitol St., Hartford, moderate rental housing. $605,000. P. J. Carroll, c/o owner, engr.

Conn., Naugatuck—HOUSING—State P. Wks. Dpt., 165 Capitol Ave., Hartford, moderate rental housing. $605,000. P. J. Carroll, c/o owner, engr.

Conn., Norwalk—HOUSING—State P. Wks. Dpt., 165 Capitol Ave., Hartford, moderate rental housing. $907,500. P. J. Carroll, c/o owner, engr.

Conn., Seymour—HOUSING—State P. Wks. Dpt., 165 Capitol Ave., Hartford, housing. $605,000. P. J. Carroll, c/o owner, engr.

Conn., Southbury—PERSONNEL—State P. Wks. Dpt., 165 Capitol Ave., Hartford, plans by Schilling & Goldbecker, 18 Trumbull St., New Haven, personnel bldg., Southbury State Training School. $525,000. Hill & Harrigan, 909 Whalley Ave., New Haven, consult. engrs. P. J. Carroll, c/o owner, engr. CD 2/7/49.

Conn., Stamford—COURT HOUSE—Comrs. Fairfield Co., 172 Golden Hill, Bridgeport, plans by William J. Provoost, 421 Main St., county court house, Hoyt St. to North St. $750,000. CD 1/23.

▲ Conn., West Hartford—SCHOOL—Town, 51 Memorial Rd., plans by Jeter & Cook, 36 Pearl St., Hartford, Richmond Lane Elementary School. $1,250,000. Paul D. Bemis, 36 Pearl St., Hartford, consult. engr. Robert W. Loomis, 32 Maple Ave., Windsor, engr. CD 2/24.

Idaho, Nampa—SCHOOL—Nampa School Dist., Nampa voted bonds three new high school bldgs. $562,000.

Ill., Chicago—SCHOOL—Bd. Educ., 228 N. LaSalle St., Zone 1, plans by Holabird Root & Burgee, 180 N. Wabash St., Zone 1, Dunbar Elementary School addn. $900,000. CD 12/1.

▲ Ill., Chicago—SCHOOL—Bd. Educ., 228 N. La Salle St., Zone 1, plans by Burnham & Hammond, 53 W. Jackson St., Zone 4, Beale Elementary School, 6043 S. Sangamon St. $1,000,000. CD 12/1.

▲ Ill., East St. Louis—HOUSING—East St. Louis Housing Auth., Stephen M. Harris, exec. dir., 1328 N. 44 St., 700-unit public housing in area eastward from 13 St. between Broadway and Missouri Ave. $17,000,000.

Ill., Lincolnwood—SCHOOL—School Dist. 74, 6855 Crawford Ave., plans by Clarence Dahlquist & Assocs., 1625 Glenview Rd., Glenview, Rutledge Hall Grade School, E. Prairie Rd. at Farwell St. $500,000.

Ind., Gary—SCHOOL—School City of Gary, 524 Garfield St., plans by Beine, Hall & Curran, 607 Broadway, elementary school, 21 and Iowa Sts. $650,000.

(Continued on page 120)

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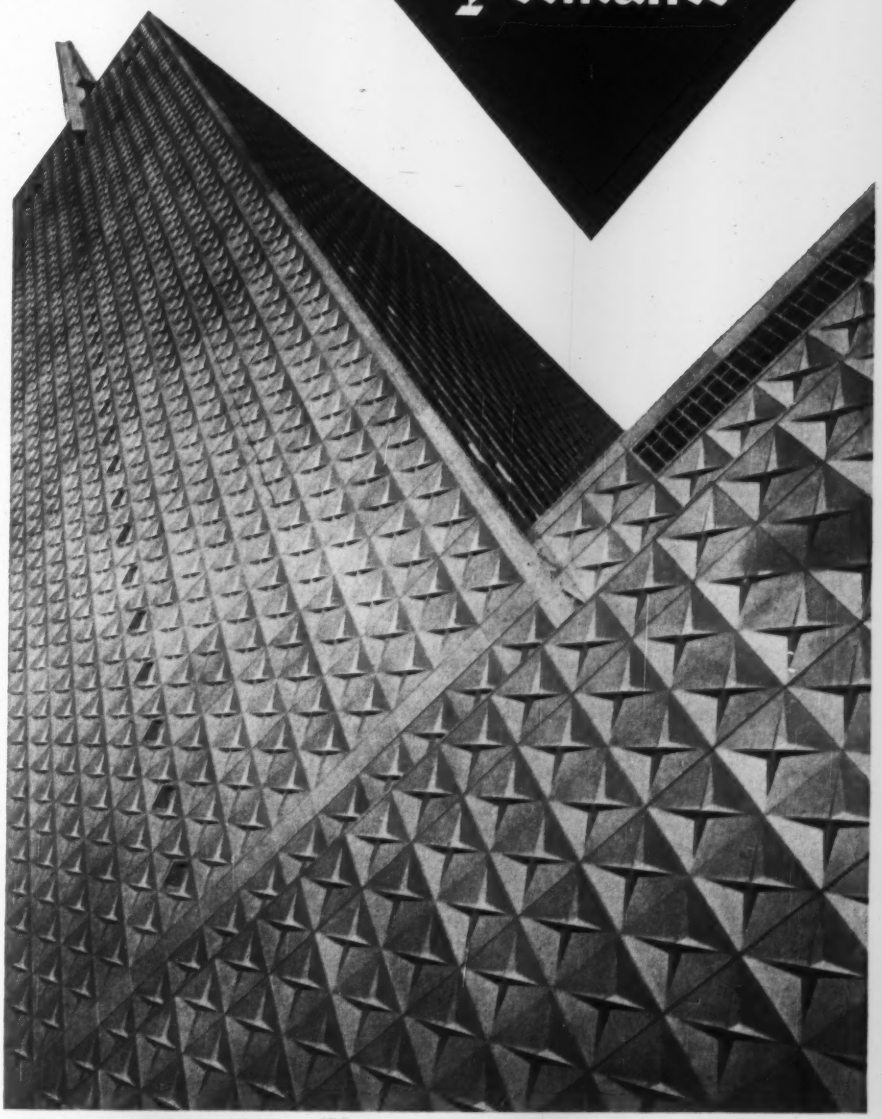

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(Continued from page 118)

▲ **Iowa, Davenport**—SCHOOL—Bd. Educ., Davenport, plans by Louis Kingscott & Assoc., 604 Putnam Bldg., Iowa, Senior High School. $3,000,000. Bids early summer of 1957.

▲† **La., New Orleans**—WAREHOUSING—U. S. Eng., Box 1229, Galveston, Tex., plans by M. Wayne Stoffle, engr.-archts., 730 Gravier St., Zone 12, warehousing for flammables, Army Base. $5,000,000.

Me., Bangor—SCHOOL—City, School Dpt., plans by Crowell, Lancaster & Higgins, 6 State St., renovations existing high school and gymnasium and shop, $600,000. CD 3/7/46.

▲ **Md., Silver Spring**—HOSPITAL—Montgomery Co. Council, Rockville, plans by White, Noakes & Neubauer, 1145 19 St. N.W., Wash., D. C., Silver Spring Memorial Hospital, Forest Glen and Georgia Ave. $4,000,000.

Md., Westminster—SCHOOL—Carroll Co. Bd. Educ., school, Carroll St. $600,000.

▲ **Mass., Canton**—SCHOOL—Town, High School Bldg. Comm., c/o Supt. Schools, plans by Collens, Willis & Beckonert, 20 Newbury St., Boston, high school. $1,600,000. CD 1/10/55.

Mass., Malden—SCHOOL—City, Bd. Educ., replacing Lincoln School, Cross St. $500,000. CD 11/17/48.

Mass., Saugus—SCHOOL—Town, Bd. Educ., Junior High School. $600,000. CD 12/13.

▲ **Mass., Townsend**—SCHOOL—Regional School Comm., Towns of Ashby, Townsend, Pepperell & Dunstable, Sup. Schools of Townsend, Townsend, plans by Kilham, Hopkin, Greeley & Brodie, 9 Arlington St., Boston, Regional Junior Senior High School, $2,200,000. CD 12/15.

▲ **Mass., Wayland**—SCHOOL—Town, School Dpt., Cochituate Rd., plans by Kilham, Hopkins, Greeley & Brodie, 9 Arlington St., Boston, elementary school, Claypit Hill Rd. $1,000,000.

▲ **Mich., Farmington**—SCHOOL—City, 33312 Grand River, voted $2,000,000 bonds Mar. 26, schools. CD 3/1.

▲ **Mich., Jackson**—SCHOOLS—City, Union School Dist., Dr. Ralph D. McLeary, supt. Schools, $10,600,000 bond election May 15, school program, Junior College, two new Junior High Schools, high school, elementary school facilities. CD 1/10.

▲ **Minn., Alexandria**—SCHOOL—Bd. Educ., A. O. Hafdal, supt., $1,200,000 bond election Apr. 30, high school. $1,000,000, Traynor & Hermanson, St. Cloud, archts. CD 12/6.

▲ **Minn., Duluth**—SCHOOL—Bd. Educ., H. J. Forsberg, clk., plans by A. R. Melander, 603 Alworth Bldg., Woodland Junior High School, Woodland Ave. and 8th St. $1,400,000. Bids in July-August. CD 4/16/54.

▲ **Mo., Webster Groves**—SCHOOL—School Dist. of Webster Groves Bd. Educ., 16 Selma Ave., Zone 19, defeated $2,850,000 bonds Apr. 3, schools. CD 3/13.

Neb., Harrisburg—HIGH SCHOOL—Banner County School Dist., Harrisburg, bond election Apr. 17, 1 and 2 story, 41,000 sq. ft. grade, Junior and Senior High School. $500,000. Robert W. Ditzen, 1135 Pearl St., Boulder, Colo., archt.-consult. engr.

▲ **N. H., Durham**—LIBRARY—University of New Hampshire, Office of President, Durham, plans by Tracy & Hildreth, 4 Davis Court, Nashua, library. $1,500,000. Bids about five or six weeks.

▲ **N. J., Annandale**—SCHOOL—Bd. Educ., North Hunterdon Regional High School Dist., Annandale, plans by Frederick Elasser, Union, high school addn. $1,500,000. Bids in 6 weeks.

▲ **N. J., Bernardsville**—HIGH SCHOOL—Bd. Educ., Somerset Hills Regional High School, Bernardsville, Senior High School, Basking Ridge, Bernards Twp., and converting Bernardsville High into Junior High School. $1,800,000.

N. J., Franklin Park—SCHOOL—Bd. Educ., Franklin Twp., Franklin Park, plans by William Micklewright of Micklewright & Mountford, 72 Ewing St., Trenton, school addns. $998,000.

▲ **N. J., Manahawkin**—SCHOOL—Bd. Educ., Stafford Twp., Manahawkin, high school. $1,500,000.

▲ **N. J., River Edge**—HIGH SCHOOL—Bd. Educ., Regional High School Dist., River Edge, plans by August Pfost, 795 Kinderkamack Rd., high school. $2,650,000. Bids in July.

N. Y., Marlboro—SCHOOL—Bd. Educ., plans by Jed Stow Reisner, 660 Madison Ave., New York, Zone 21, high school. $900,000. To go ahead in the Fall.

▲ **N. Y., Massapequa**—SCHOOL—Union Free School Dist. No. 23 plans by George J. Dippel, 124 Merrick Rd., Massapequa, Junior High School on 50 acre tract, $1,600,000.

O., Clearview—SCHOOLS—Clearview Local School Dist., 4700 Broadway, Lorain, voted bonds Mar. 27, addns. to high school and elementary school. $580,000. Ward & Conrad, Hanna Bldg., Cleveland, Zone 15, archts. CD 2/7.

O., Cleveland Heights—CITY HALL—City, City Hall, 2953 Mayfield Rd., Cleveland, Zone 18, city hall. $500,000. Bids late in 1957.

O., Deer Park—SCHOOL—Deer Park Local School Dist., Deer Park, $700,000 bond election May 8, school addns. Sullivan-Isaacs-Sullivan & Assoc., 1800 Reading Rd., Cincinnati, engrs.-archts. Bids late Fall. CD 11/15.

O., Fremont—COUNTY HOME—Comrs. Sandusky Co., Court House, county home. $750,000.

O., Lincoln Heights—SCHOOL—Lincoln Heights Bd. Educ., McGee St., plans by Sullivan-Isaacs-Sullivan & Assoc., 1800 Reading Rd., Reading, 2 story, brick, rein.-con. high school, McGee St., $750,000. Bids late Summer.

O., Peebles—SCHOOL—Bd. Educ., plans by Howard & Thos. McClorey, 3002 Woodburn St., Cincinnati, high school addns. $500,000. Bids early in June.

O., Sharon Center—SCHOOL—Bd. Educ., Highland School Dist., high school, $680,000.

▲ **O., Sharonville**—SCHOOLS—Princeton Local School Dist., 336 Reading Rd., bond election June 8, Junior and Senior High School, Sharon Ave. and Chester Rd. $3,000,000. Bids late fall. Potter, Tyler, Martin & Roth, 126 E. 6 St., Cincinnati, archts. Fosdick & Hilmer, Union Trust Bldg., Cincinnati, consult. engrs. CD 1/10.

Okla., Chickasha—HIGH SCHOOL—Bd. Educ., Chickasha, voted bonds Mar. 27, high school. $750,000. Woodrow Bowers, c/o owner, engr. CD 3/7.

Okla., Lawton—HIGH SCHOOL—Bd. Educ., Lawton, voted bonds, Junior High School. $650,000. Paul Harris, Lawton, archt.

▲ **Pa., Millersville**—SCHOOL—Manor Joint High school, constr. high school, $2,000,000. Shay & Assoc., Packard Bldg., Phila., consult. engrs.

▲ **Tex., Austin**—ELECTRIC POWER PLANT, etc.—City, City Hall, electric power plant and lines. $6,000,000. CD 2/10/54, under Public Buildings and Unclassified.

▲ **Tex., Fort Worth**—COURT HOUSE—Tarrant Co., Judge Gus Brown, Court House, plans by Wyatt C. Hedrick Co., 1200 T & P Bldg., 5 story brick, tile, concrete courthouse addn. $1,250,000.

Wash., Burlington—SCHOOLS—Burlington-Edison School Dist. 100, Burlington, bond election May 8, combined high school and elementry school. $600,000. G. W. Bentley, Luther Bldg., Bellingham, archt. CD 1/5.

▲ **Wash., Camas**—SCHOOL—School Dist. 117, Camas, bond election May 8, high school. $1,175,000.

▲ **Wash., Moses Lake**—HIGH SCHOOL—School Dist. 161, Moses Lake, plans by Hovind, Harthorne & Smith, 1500 Westlake Ave. N., Seattle, high school. $1,000,000 CD 1/18.

▲ **Ont., Morrisburg**—HOUSING UNITS—Central Mortgage & Housing Auth., Montreal Rd., Ottawa, 110 rental housing units. $1,150,000.

▲ **Ont., Ottawa**—UNIVERSITY—University of Ottawa, Laurier Ave. E., new university bldgs. $5,000,000.

Que., Montreal—MUNICIPAL YARD—City, City Hall, municipal yard exten., incl. 40x353 ft. warehouse, 30x120 ft. office, electrical div. garage. $570,000. Lucien L'Allier, c/o owner, ch. engr. Bids soon.

COMMERCIAL BUILDINGS

▲ **Ala., Birmingham**—SHOPPING CENTER—Shepherd-Sloss Realty Co., 105 S. 2 St., plans by Henry Sprott Long, Brown-Marx Bldg., 228,000 sq. ft. shopping

(Continued on page 122)

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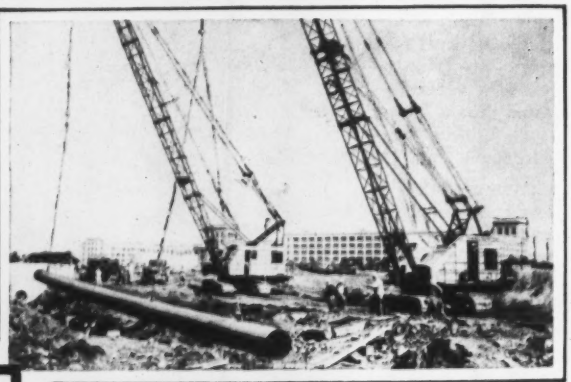

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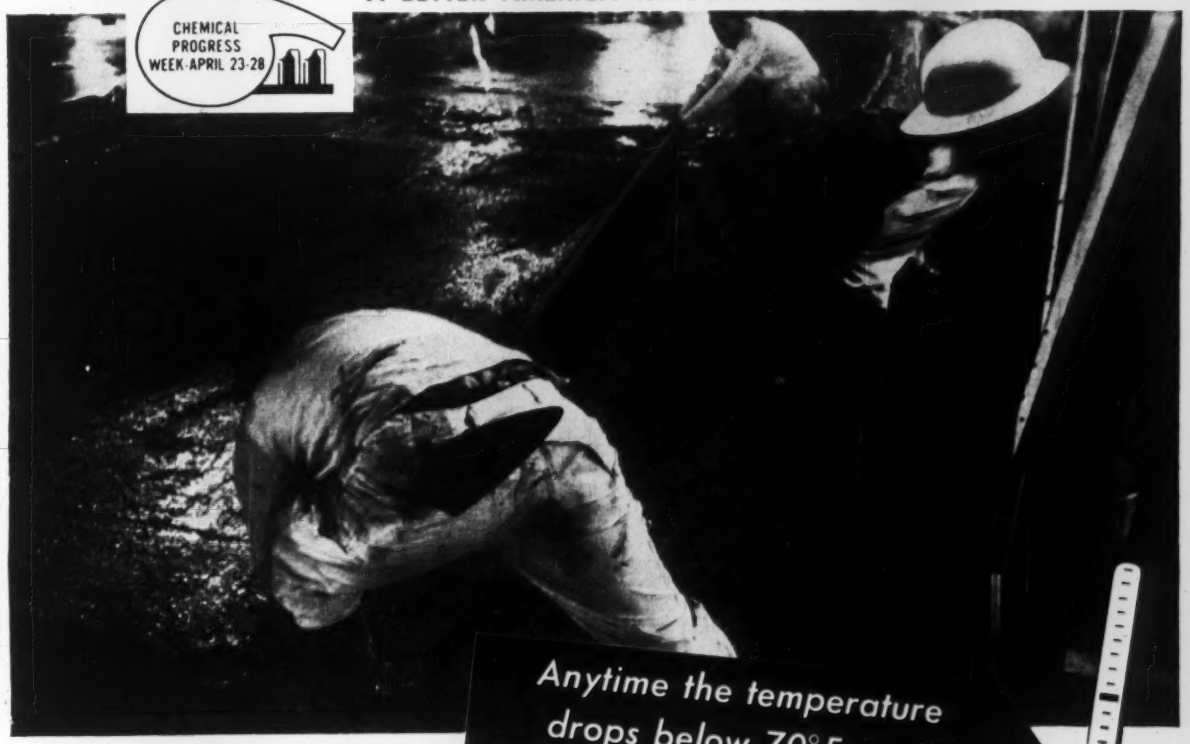
CHEMICAL PROGRESS WEEK-APRIL 23-28



COLUMBIA CALCIUM CHLORIDE GIVES YOU STRONGER CONCRETE

FASTER!

On any job . . . large or small . . . indoors or outdoors . . . if the temperature drops below 70 degrees F., you need Columbia Calcium Chloride to avoid lag in the set of concrete—and to assure high early and ultimate strength.

It's easy to use this high grade calcium chloride—it can be added to the mix manually, or by automatic feeders. Calcium chloride is easy to control in either flake form or solution.

Here are some of the advantages you get:

FASTER SET! Under normal conditions, Columbia Calcium Chloride will cut the initial set from three hours down to one, and the final set from six hours to two. The effects are even more pronounced at lower temperatures. Think what this means in getting finishers on the job fast . . . in avoiding costly overtime!

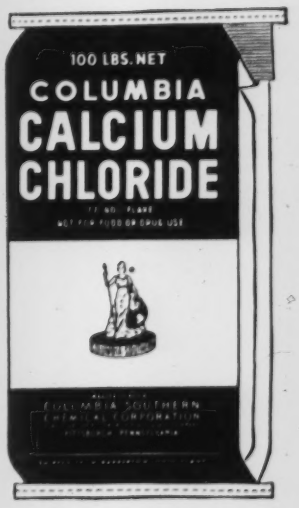
QUICKER EARLY STRENGTH! At 40 degrees F., for example, the strength of Columbia Calcium Chloride cured concrete is as great in one day as plain concrete is in two days—in three and a half days it is as strong as plain concrete after seven days! You can keep the job moving at cost-saving speed with calcium chloride!

GREATER ULTIMATE STRENGTH! Ultimate strength, too, is greater through the use of Columbia Calcium Chloride. Typical increases from tests show 9% in 3 years, 10% in 5 years.

RELEASES FORMS FASTER! The use of Columbia Calcium Chloride means forms can be moved to other sections faster, cutting down on the total time required for the job, or releasing them for other jobs sooner. You have less money tied up in expensive forms.

INCREASED WORKABILITY! Workability increases without change in the water/cement ratio when Columbia Calcium Chloride is used.

Write today for more information.



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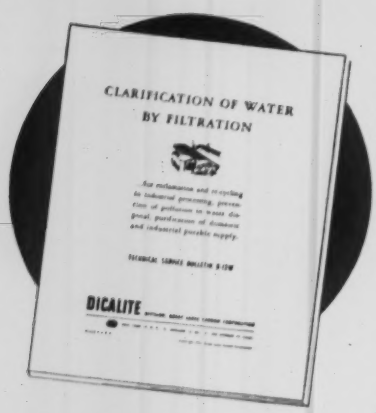
IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division



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(Continued from page 120)

center and parking area in Five Points West on Bessemer Rd. $2,000,000.

▲ **Ala., Florence**—HOTEL—Sheraton Corp. of America, 870 7 Ave., New York, N. Y., 150-room hotel with swimming pool $2,250,000.

Ariz., Phoenix—APARTMENT—KLS Constr. Co., 211 W. Linger Lane, three apartment bldgs. $600,000.

Calif., Muscoy—DWELLINGS—J. B. Construction Co., 15038 Ventura Blvd., Sherman Oaks, plans by James F. Lamb Assoc., 436 W. Foothill Blvd., Rialto, 80 frame, stucco dwellings, Miscoy area. $750,000.

▲ **Calif., Santa Monica**—HOTEL—Miramer Hotel, 1112 2 St., Santa Monica, plans by Frank W. Green, 5255 Lakeside Dr., Reno, Nev., hotel wtih heliport on top. $3,000,000. To go ahead in 90 days.

▲ **Calif., Van Nuys**—DWELLINGS—California Pacific Constr. Co., 11261 Magnolia Blvd., North Hollywood, plans by David Freedman, 201 N. Robertson St., Beverly Hills, 151 frame, stucco dwellings, Saticoy and Fallbrook Sts. $1,500,000.

Conn., Bridgeport—SUPERMARKET—Food Fair Stores, Inc., 1595 Capitol Ave., Bridgeport, super market, Boston Ave. $500,000.

▲ **Conn., Wethersfield**—SHOPPING CENTER—Arlington Holding Co., 521 5 Ave., New York, N. Y., shopping center 44-acre tract on turnpike. $4,000,000. Bids in August.

▲ **Conn., Windsor**—SHOPPING CENTER—Park Regional Corp., 164 Broad St., plans by Kane & Fairchild, 734 Asylum Ave., Hartford, shopping center. $4,000,000.

▲ **Fla., Panama City**—HOTEL, etc.—Honeymoon Hotel Corp., Panama City, plans by Warren-Knight & Davis, Protective Life Bldg., Birmingham, Ala., 160-unit hotel and restaurant, Crescent Beach. $3,000,000. Bids maybe this Fall.

Ill., Chicago—SAVINGS and LOAN—United Savings & Loan Assn., 1601 W. Roosevelt Rd., plans by The Cunneen Co., 1225 Vine St., Phila., Pa., Savings & Loan Bldg. $500,000.

▲ **Ill., Elmhurst**—HOSPITAL—Memorial Hospital of Du Page County, Elmhurst, plans by Schmidt, Garden Erikson, 104 S. Michigan Ave., Chicago, Zone 3, hospital addn. $1,375,000.

Ill., Hinsdale—MEDICAL CENTER—Kettering Family Foundations, c/o Phillip D. West, archt., 33 E. 1 St., medical center. $630,000. CD 2/28.

Ill., Naperville—SHOPPING CENTER—Harold E. Moser, c/o Moser Lumber Co., Naperville, plans by Raulin B. Wight, Jr., 1039 Curtiss St., Downers Grove, shopping center. $600,000.

▲ **Ind., East Chicago**—HOMES—American Construction Corp., 1120 Carroll St., plans by L. Harry Warriner, 527 Broadway, Gary, 350 homes. $3,500,000.

Kan., Wichita—CHURCH—College Hill Methodist Church, First and Erie Sts., plans by Schmidt-McVay & Paddie, 1832 E. 2 St., church, First and Chautauqua St. $500,000.

▲ **La., Fort Polk**—HOUSING—U. S. Eng., Box 1229, Galveston, Tex., plans by Alexander, Dunaway & Jones, Johnson, Brown & Butler, 2712 Danville Ave., Houston, Tex., construct and finance 2,000 housing units, (Capehart Housing). $5,000,000. CD 1/13, under Public Buildings.

Me., Limestone—HOUSING—U. S. Eng., 150 Causeway St., Boston, Mass., construct and finance 64 family housing units, Loring Air Force Base. $860,000.

Mass., Boston—MERCHANTS—Chinese Merchants Assoc., 20 Hudson St., plans by Shepley, Bulfinch, Richardson & Abbott, 1 Court St., Chinese Merchants Bldg., 20 Hudson St. $500,000.

▲ **Mass., Lenox**—NOVITIATE—New England Province of the Society of Jesus, Very Rev. William E. Fitzgerald, provincial, 297 Commonwealth Ave., Boston, plans by J. Gerald Phelan, 211 State St., Bridgeport, Conn., Jesuit Novitiate "Shadowbrook". $3,000,000. Fletcher-Thompson, Inc., 211 State St., Bridgeport, Conn., engr.

▲ **Neb., Lincoln**—OFFICE—State Farm Mutual Auto Insurance Co., 1014 "O" St., office, Cotner and O Sts. $1,000,000.

Neb., Omaha—SCIENCE—Creighton University, 25 and California Sts., plans by L. A. Daly Co., Insurance Bldg., science bldg. $529,000.

▲ **N. J., Harrington Park**—HOMES—James D'Agostino, 133 Cedar Lane, Teaneck, plans by Fred Hansen, Tenafly, 60 homes to form Harrington Park Manor. $1,250,000.

N. Y., Brooklyn—APARTMENT—Globe Leasing Corp., 97-27 64 Rd., Forest Hills, plans by Lama, Proskauer & Prober, 395 Pearl St., Zone 1, 6 story apartment, 1064-1068 East New York Ave. $600,000.

▲ **N. Y., Brooklyn**—LABORATORY—Jewish Hospital of Brooklyn, Inc., 555 Prospect Place, Zone 16, plans by Charles B. Meyers Assoc., 31 Union Square, New York, Zone 3, 3 story laboratory and surgical bldg., St. Marks Ave. and hospital bldg., Prospect Place. $4,000,000. CD 5/5.

▲ **N. Y., New York**—SCHOOL—Cooper Union, Fourth Ave. and Seventh St., plans by Harrison & Abramovitz, 600 Fifth Ave., Zone 20, 6 story School of Engineering, on block bounded by Third Ave., Fourth Ave., Astor Place and 9 St. $3,000,000. To go ahead in 1957. CD 12/13.

▲ **N. Y., New York**—APARTMENTS—George L. Rabinor, c/o S. J. Kessler & Sons, archts., 551 Fifth Ave., Zone 17, 14 story apartment, 249 units, Third Ave. and 18 St., $1,500,000; apartment 110 unit, at 244-46 W. 57 St., $718,000

▲ **O., Parma**—HOMES—Seltzer-Wickham-Storme Co., 4169 Pearl Rd., Cleveland, Zone 9, 82 homes, Ridge Rd., south of Ridgewood Dr. $2,050,000.

▲ **O., Twinsburg**—HOUSING—Grant-Halliday Constr. Corp., Callahan Bldg., Dayton, 1,000 homes on 1,000 acre site in Twinsburg Twp. and Twinsburg Village, off Rte. 91. $10,000,000.

▲ **Okla., Altus**—HOUSING—Purch. & Contg. Office, Altus Air Force Base, Altus, plans by Parr & Aderhold and C. H. Guernsey & Co., 513 N. Broadway, Oklahoma City, construct and finance, 700 unit housing, Altus Air Force Base. $7,000,000. CD 1/31.

Pa., Johnstown (Richland Twp.)—SHOPPING CENTER—Bel-Air, Inc., 245 Green St., plans by Horace Bailey, 305 Bedford St., 1 story, steel, brick shopping center, $500,000.

▲ **Pa., Phila.**—STUDENT UNION—LaSalle College, 20 St. and Olney Ave., plans by Carroll Grisdale & Van Alen, 204 W. Ritterhouse Square, student union bldg., $1,000,000. CD 11/17.

▲ **Pa., Phila.**—SHOPPING CENTER—Owner, c/o Friedman Strouse Greenberg & Co., 1525 Locust St., shopping center, Roosevelt Blvd. and Solly St. $1,000,000.

Pa., Sharon—HOSPITAL—Shenango Valley Society of Osteopathic Physicians, Dr. Wendell E. Mook, pres., Sharon, plans by Hunter, Heiges & Gross, 1344 E. State St., osteopathic hospital. $600,000. CD 3/20.

▲ **Tex., Dallas**—STORES—Sanger Bros., Main and Lamar Sts., constr. 2nd merchandising store, Hys. 80 and 67, $3,000,000; 3rd suburban merchandising store, $2,250,000. CD 7/12/46.

▲ **Tex., Houston**—CHURCH—First Christian Church Congregation, Main and Bell Sts., plans by Hamilton Brown, 2017 W. Gray St., 55,000 sq. ft. masonry church. $1,250,000. CD 9/23/53.

Tex., Houston—OFFICE—Union Carbide & Carbon Chemical Corp., Prudential Bldg., plans by Golemon & Rolfe, 5100 Travis St., office, W. Alabama and Wesleyan Sts. $500,000.

Tex., Mesquite—MOTEL, etc.—Alexander Motor Co., 118 Commerce St., 95 luxury motel units, swimming pool, 30 cabanas, 225 auto parking paved space, 10-acre site, U. S. Hy. 87 and Gross Rd. $500,000.

▲ **Tex., Pasadena**—SHOPPING CENTER—Texas Southwest Corp., c/o Harry L. Tooker, archt.-engr., plans by Harry L. Tooker, P.O. Box 1005, Pasadena, and Francis J. Niven, 2124 Welch St., Houston, archts.-engrs., regional shopping center. $5,000,000.

Wash., Quincy—HOUSES—Kane, Collins & Randolph, Quincy, 70 houses in southeast section. $800,000.

▲ **Wash., Seattle**—REHABILITATION CENTER—King Co. Society for Crippled Children & Adults, c/o Decker, Christenson & Kichin, archts., 1411 4 Ave. Bldg., Seattle, Zone 1, rehabilitation center. $1,200,000. Work within a year.

Ont., Toronto—HOTEL—Regency Towers Hotel, 89-95 Avenue Rd., plans by W. Shulman, 1173 Bay St., 500-room hotel addn. Over $500,000. Work to start in July.

Ont., Toronto—SYNAGOGUE—Temple Sinai, c/o H. J. Pollock, 63 Invermay Ave., plans by Murray Sklar, 195 Bay St., and S. Devore, 1695 Avenue Rd., part stone, brick and curtain wall synagogue. $500,000.

▲ **Que., Pont Viau**—SHOPPING CENTER—Maxwell Cummings & Sons, 1226 St. Catherine St. W., Montreal, plans by Ian Martin, 1200 St. Alexander St., Montreal, 20-store shopping center. $1,000,000. Work to start end of 1956.

INDUSTRIAL BUILDINGS

Ala., Birmingham—PLANT—Southern Can Corp., 404 N. 21 St., can mfg. plant. $750,000. Payne Eng. Co., 1812 28 Ave. S., Zone 9, consult. engr.

Ala., Birmingham—PLANT—Western Grain Co., 1003 N. 17 St., steel, concrete bulk feed handling plant addn. $500,000.

▲ **Ariz., Clarkdale**—PLANT—Apache Gypsum Co., 4012 N. Central Ave., Phoenix, gypsum plant. $16,000,000.

▲ **Calif., Burlingame**—WAREHOUSE, etc.—Purity Stores Ltd., Kearny and San Francisco Sts., San Francisco, 200,000 sq. ft. warehouse and office, Mills Dale Industrial Park. $1,000,000.

Calif., El Monte—FACTORY—Art Weiss Motors, Inc., 9753 E. Garvey Ave., three 90,000 sq. ft. frame, stucco factory bldgs. $500,000.

▲ **Calif., Sunnyvale**—PLANT—General Motors Corp., 1775 Broadway, New York 19, N. Y., 1,500,000 sq. ft. Buick-Oldsmobile-Pontiac Assembly Plant, Bayshore Hy. and Lawrence Station Rd. $15,000,000. Bids in about 90 days.

▲ **Colo., New Castle**—MILL—Allied Paper Mills Div., Security Bldg., Denver, pulp mill, $1,000,000.

▲ **Ga., Marietta**—ENGINEERING, etc.—Lockheed Aircraft Corp., Marietta, plans by Robert & Co. Assoc., archts.-engrs., 96 Poplar St. N.W., Atlanta, 300,000 sq. ft. advanced-design engineering bldg., second shop and office, 104-acre site adjacent to present plant, $7,500,000.

▲ **Ill., Chicago Heights**—CENTRAL RESEARCH FACILITIES—Victor Chemical Co., 141 W. Jackson Blvd., Chicago, Zone 4, central research facilities expansion. $2,000,000.

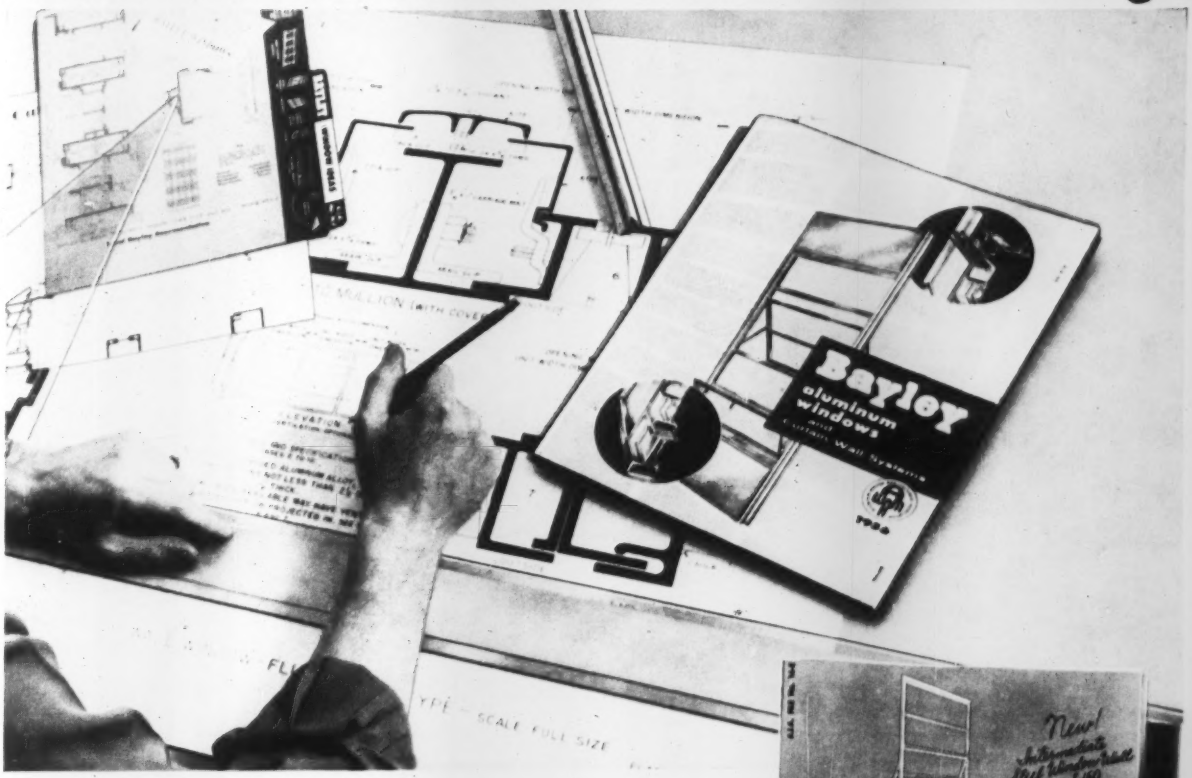
Ill., Cicero—WAREHOUSE—Cities Service Oil Co., Bartlesville, Okla., warehouse, $700,000.

▲ **Ind., Columbus**—FACTORY—Cummins Engine Co., R. E. Huthsteiner, pres., Columbus, plans by Harry Weese, archt-engr., 612 N. Michigan Ave., Chicago, Ill., 73,000 sq. ft. factory. $1,000,000. CD 3/30.

▲ **Ind., Indianapolis**—WAREHOUSE—General Electric Co., River Rd., Schenectady, N. Y., appliance div.

(Continued on page 125)

Send TODAY for these two new catalogs



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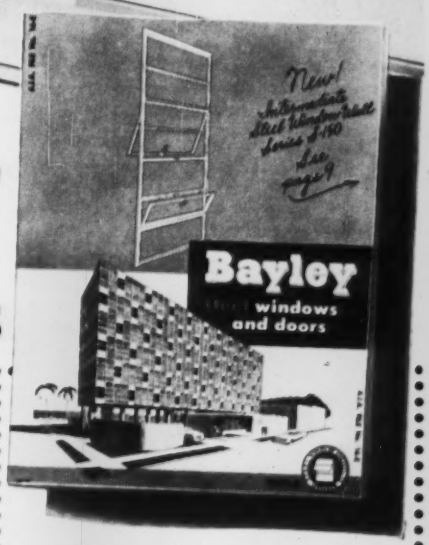

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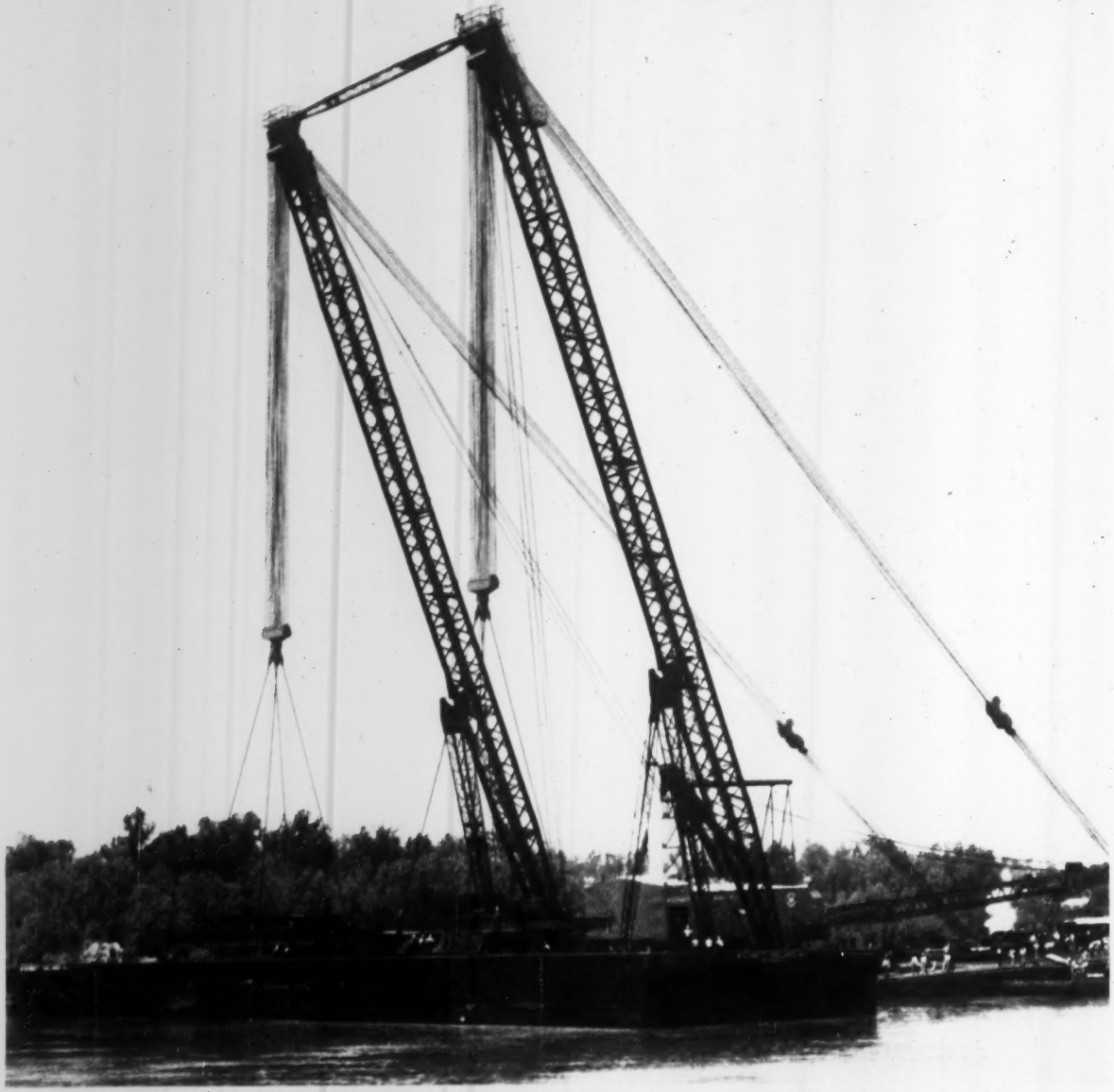

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It is significant that the makers of this giant, American Hoist and Derrick Company, fabricated the sheerlegs from Mayari R high-strength, low-alloy steel. Mayari R is 50 pct stronger than carbon structural steel, five to six times more corrosion-resistant, and fully as weldable. For the full story on Mayari R, write for Catalog 353.

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(Continued from page 122)

warehouse, 8-acre tract on south side of Brookville Rd. between Arlington and Kitley Sts. $1,500,000. CD 11/27/51.

▲ **Ind., Indianapolis** — GARAGE, etc. — Indianapolis Water Co., 113 Monument Circle, Zone 4, plans by Daggett, Naegele & Daggett, 565 W. Westfield Blvd., 2 story garage and office, $2,000,000. CD 4/5.

▲ **Ind., Indianapolis**—FOUNDRY, etc.—Link-Belt Co., 220 S. Belmont St., foundry and mfg. facilities. $3,500,000. Will start this spring.

▲ **Ky., Louisville**—FOUNDRY—American Radiator & Standard Sanitary Mfg. Co., 1541 S. Seventh St., plans by Prack & Prack, engrs.-archts., 517 Martin Bldg., Pittsburgh, Pa., foundry, $1,300,000. Bids late Spring or early Summer.

▲ **La., Scott**—POWER STATION—Gulf States Utilities Co., 362 Liberty Ave., Beaumont, Tex., two 111,000 kw. power units at electric power station, $34,000,000. First unit for completion 1958, second a year later.

▲ **N. J., Bayonne**—PLANT BLDGS.—General Cable Co., 420 Lexington Ave., New York, N. Y., renovating several plant bldgs. and expansion of Bayonne Div., 243 W. 1st St. $4,000,000.

▲ **N. Y., Buffalo**—PLANT—Buffalo Evening News, 214 Main St., Plans by William Ginsberg, 331 Madison St., New York, newspaper publishing plant at Washington, near Perry St. $2,000,000.

N. Y., New York—GARAGE—Third Avenue Transit Corp., 116 W. 32 St., Zone 2, plans by Frank S. Parker Assoc., 205 E. 43 St., Zone 17, bus garage, 4055 Ninth Ave. and 341 W. 216 St. $700,000.

▲ **N. Y., Schenectady**—GAS TURBINE—General Electric Co., River Rd., gas turbine department addn. and headquarters bldg. $8,000,000 with equipment. CD 10/8/53.

▲ **O., Akron**—WAREHOUSE—Fred W. Albrcht Grocery Co., 750 E. Talmadge St., 175,000 sq. ft. warehouse to serve chain stores, on 25 acre tract on Gilchrist Rd. $1,750,000.

▲ **O., Cleveland**—LABORATORY—General Electric Co., River Rd., Schenectady, N. Y., plans by Voorhees, Walker, Smith & Smith, 101 Park Ave., New York, N. Y. 3 story, brick, concrete, lamp development laboratory at Nela Park Works, East Cleveland. Est. $4,000,000-$5,000,000. CD 3/29.

O., Niles—MILL—Mahoning Valley Steel Co., John P. Hosack, pres., Niles, tube mill. $500,000.

▲ **Tex., Arlington** — WAREHOUSE — Zeckendorf-Angus Wynne Jr. Interests, 401 Wynnewood Village, Dallas, 1,000,000 sq. ft. masonry, industrial warehouse in 2,500-acre site. $6,500,000.

Tex., Fort Worth—WAREHOUSE—Food Mart, Inc., c/o Gordon Foster, P.O. Box 822, El Paso, plans by Wyatt C. Hedrick Co., 1200 T & P Bldg., 107,000 sq. ft. warehouse; 6,500 sq. ft. office, 2800 block Seminary Dr. $750,000.

▲ **Wash., Ruston**—PLANT—American Smelting & Refining Co., 120 Broadway, New York, N. Y., plant to derive sulphur dioxide from wastes created in copper smelting process. $4,000,000. will go ahead six months after plans approved.

UNCLASSIFIED

Alabama — RURAL DISTRIBUTION LINES — Covington Electric Co-operative, Andalusia, 30 mi. rural distr. lines and sys. imprv., Covington Co. $520,000.

▲ **Ala., Brewton**—NATURAL GAS SYSTEM—City, City Hall, extending natural gas service to nearby Evergreen and Monroville, approx. 60 mi., $1,800,000.

Calif., Los Altos—PARKING PLAZAS—City, City Hall, several parking plazas in downtown section. $999,382.

▲ **Ill., Chicago**—RAPID TRANSIT LINE EXTENSION—City, City Hall, Rapid Transit Line extension of Chicago Transit Auth. from Logan Sq. elevated terminal to Northwest Highway. $30,000,000. CD 6/12/52.

Kansas—RURAL DISTRIBUTION LINES—Lane-Scott Electric Co-operative, Dighton, 91 mi. rural distr. lines 26 irregation pumps, two grain elevators, 12 oil wells, 16 mi. tie lines, Lane and Scott Counties, $575,000, J. C. Leavitt Co., Garden City, consult. engrs. CD 4/3.

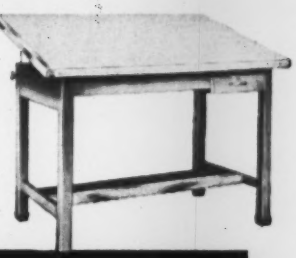
▲ **Kentucky**—RURAL DISTRIBUTION LINES—Warren Rural Electric Co-operative Corp., Bowling Green, 587 mi. rural distr. lines, sys. improvs., Warren Co. $1,840,000. CD 7/1/49.

Massachusetts—BAY DEVELOPMENT—Commonwealth of Mass., Metropolitan Dist. Comn., Parks Div., 20 Somerset St., Boston, D-501, development of Pleasure Bay, South Boston, $750,000. Fay, Spofford & Thorndike, 11 Beacon St., Boston, consult. engrs. (for studies only).

▲ **Mass., Boston**—OFF-STREET PARKING—City, Real Property Dpt., City Hall, plans by John M. Gray Co., 169 High St., off-street parking facility Fort Hill Square, $1,430,000.

▲ **Missouri**—RURAL DISTRIBUTION LINES—M & A Electric Power Co-operative, Poplar Bluff, 78 mi. 69 KV rural distr. lines, 4 new sub-stations, headquarters facilities, Ripley Co. $1,006,000. CD 4/7/54.

▲ **New York and Massachusetts**—CONVERTING TRACK—Boston & Albany R.R., (New York Central R.R.), R. R. Smith, engr. of maintenance and way sys., 466 Lexington Ave., New York 17, N. Y., converting double track to single track between Albany, N. Y. and Boston, Mass. $6,039,000. To be completed Sept. 1957.



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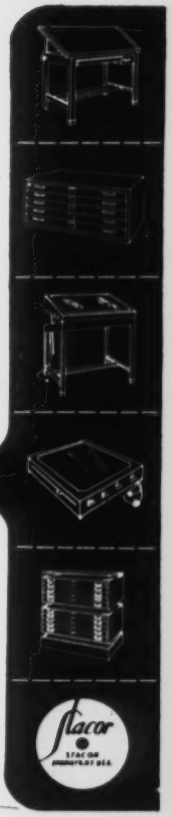

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Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS
April 24 Massachusetts

Conn., Hartford—BA 4/24—City, City Hall, engines and gears for the North and South Meadows Pumping Stations, Contr. E 56-257. $828,000. Winfred W. DeMay, city engr. CD 4/4.

BUILDINGS—BA

R. I., North Smithfield—HIGH SCHOOL—BA 5/3—Town, Andre R. Bonte, chn. Bldg. Comn., North Smithfield, Junior High School and elementary school. $500,000. Plans deposit $25. Cull, Robinson & Green, 385 Benefit St., Providence, archts. CD 11/30.

HEAVY CONSTRUCTION—LB & CA

S. & A. Allen Constr. Co., Inc., 330 Rutherford Ave., Charlestown, Mass. LB **$437,000**, est. $450,000. off street parking structure Lincoln and Essex Sts., BOSTON, MASS. City, Real Property Bd., City Hall Annex, Boston, Mass. Bids Mar. 27. CD 3/13.

R. Zoppo Co., Inc., 842 Providence Hy., Norwood, Mass. LB **$575,950**, est. $575,000. two sewage pumping stations, etc., CRANSTON, R. I. City, Bd. Contr. & Purch., Purch. Agent, City Hall, Cranston, R. I. Bids Apr. 5. CD 3/28.

BUILDINGS—LB & CA

Carroll, Verge & Whipple, Inc., 370 Wahconah St., Pittsfield, Mass., LB **$549,898**, est. $525,000. DORMITORY "J", State School, BRANDON, VT. State, State Bldg. Council, State Office Bldg., Burlington, Vt. Cleverdon, Varney & Pike, 20 Tremont St., Boston, Mass., structural engrs. Bids Apr. 3. CD 2/1.

▲ **Tocci Bros. Constr. Co.**, 38 Colonial Ave., Newtonville, Mass. CA **$1,422,721**, est. $1,400,000. Elementary SCHOOL, Plymouth St., EAST BRIDGEWATER, MASS. Town, High School Bldg. Comn., c/o Supt. Schools, No. 4, North Bedford St., East Bridgewater, Mass. CD 3/21, under LB.

A. F. Smiley Constr. Co., 115 Trenton St., Pawtucket, R. I. LB **$551,400**, est. $550,000. Ralph M. Small Elementary SCHOOL, London St., FALL RIVER, MASS. City, School Dpt., City Hall, Fall River, Mass. Bids Apr. 4. CD 3/13.

Turner Constr. Co., 420 Lexington Ave., New York, N. Y., CA, **$500,000**, two steel, concrete PLANT **bldgs., NEW BRITAIN, CONN.** The Stanley Works, 195 Lake St., New Britain, Conn. Awarded Apr. 2.

▲ **George B. H. Macomber Co.**, 19 Milk St., Boston, Mass. CA **$1,800,000**, four DORMITORIES, at Divinity School, NEW HAVEN, CONN. Yale University, New Haven, Conn. CD 1/11.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
April 26 Maryland
STREETS AND ROADS
April 24 New Jersey

BUILDINGS—BA

▲ **N. Y., Carthage**—SCHOOL—BA 4/26—Carthage Central School Dist., Junior-Senior High School, $2,000,000, Sargent, Webster, Grenshaw & Folley, 2112 Erie Blvd., E., Syracuse, archts. CD 2/1.

▲ **Pa., Doylestown**—SCHOOL—BA 5/2—Central Bucks Joint School Auth., Doylestown Junior High School, $1,000,000. Micklewright & Mountford, Morrisville, N. J., engrs.-archts. CD 3/17/55.

▲ **Pa., Sanatoga**—SCHOOL—BA 5/10—Lower Upper & West Pottsgrove Twp. Joint School Bd., Sanatoga, Junior-Senior High School, $1,800,000. Buchart Eng. Corp., 920 Columbia Ave., Lancaster, engrs.-archts. CD 1/5/55.

BUILDINGS—SLC

Pa., Cornwell Heights—TUBE BENDING BLDG.—Badenhausen Corp., Cornwell Heights, soon lets contract 1 story, brick, masonry 50,000 sq. ft. tube bending bldg. $500,000. The Ballinger Co., 121 N. Broad St., Phila., engr.-archt.

HEAVY CONSTRUCTION—LB & CA

▲ **Oakhill Contg. Co., Inc.**, 41-10 102 St., Corona, N. Y. CA **$4,328,954**, est. $4,337,000 (5 bidders) storm water relief sewer, appurtenances, 19 Ave., 80 St., Grand Central Parkway; storm water sewer, appurtenances, 77 St.; combined sewer, appurtenances 24 Ave., 81 St., 77 St., 30 Ave., 70 St., 80 St., 21 Ave.; existing combined sewer, appurtenances 80 St., Astoria Blvd., 24 Ave.; sanitary sewer, appurtenances 80 St., NEW YORK. President Queens Boro, Queens Boro Hall, 120-55 Queens Blvd., Kew Gardens 24, N. Y. CD 3/9, under LB.

▲ **Electrical Constructors**, 1758 Cleveland St., Columbus, O. LB **$1,253,791**, electrical work at Barnhart Island Power Plant, near Massena, St Lawrence Co., Spec. No. PA-5-14030, St. Lawrence Contr. No. 25, NEW YORK. The Power Authority of the State of New York, 270 Broadway, New York 7, N. Y. Bids Apr. 10. CD 3/15.

▲ **Melwood Constr. Co.**, 507 Fifth Ave., New York 17, N. Y. LB **$1,461,206**. (8 bidders) Harlem River Drive Improvement East 125 St. to Harlem River Driveway, Contr. No. 125E, superstructure 127 Street overpass paving, parks, playgrounds, general constr. of park bldgs., E. 125 Sta. to 132 St., NEW YORK, N. Y. President Manhattan Boro, Municipal Bldg., New York 7, N. Y. Bids Apr. 6. CD 3/15.

Consolidated Contractors & Intercoastal Constr. Co., 309 S. Third St., Hammonton, N. J. CA **$524,962**, sanitary sewerage sys., CLAYTON, N. J. Clayton Sewerage Auth., Clayton, N. J. Lanning Sanitary Eng. Co., Inc., 1100 S. Broad St., Trenton, N. J., engr. Bids Mar. 27, CD 2/27/45;
C & T Affiliates, 810 Haddon Ave., Collingswood, N. J. LB **$367,875**, sewage treatment plant, 2 pumping stations (Clayton, N. J.).

▲ **PENNSYLVANIA**—State Hy. Dpt., 506 N. Office Bldg., Harrisburg,
Pa.—**James Julian, Inc.**, 405 S. DuPont Rd., Elsmore, Del. LB **$1,999,267** (11 bidders) constr. 27,517 ft. divided hy. of c. conc. 24 ft. wide, each side earth and concrete divisor, Hamburg Boro, Windsor and Greenwich Twps., T.R. 22, Berks Co.;
Pa.—**R. J. Nichols, Inc.**, Box 229, Kittanning, Pa. LB **$118,078** (3 bidders) wid'n. 2,317 ft. existing road with crushed aggregate width surf. new and existing road with bit. surf. 33 ft. wide, Buffalo and S. Buffalo Twps., T.R. 28, Butler and Armstrong Counties;
Pa.—**Foster Grading Co.**, R.D. 2, Jackson Center, Pa. LB **$129,916**. (5 bidders) wid'n. 5,496 ft. existing road with crushed base and surf. new and existing pavement with bit. surf., Emporium Boro, Shippen Twp., T.R. 46, Cameron Co.; LB **$192,069**. (4 bidders) wid'n., 12,398 ft. existing road with crushed aggregate base surf. new and existing road with bit. surf., Lewis Run Boro, Bradford Twp., T.R. 219, McKean Co.;
Pa.—**Middlecreek Constr. Co.**, Middleburg, Pa. LB **$324,397**. (8 bidders) constr. 27,538 ft. crushed aggregate base with bit. surf. West Cameron and East Cameron Twps., L.R. 49012 (5), Northumberland Co.;
Pa.—**D. F. & D. R. Farabee**, Amity, Pa. LB **$119,333**. (4 bidders) constr. 2,602 ft. c.-con. pavement 36 ft. wide, Waynesburg Boro, T.R. 21, Greene Co.;
Pa.—**W. L. Dunn Constr. Co.**, Cochranton, Pa. LB **$154,521**. (6 bidders) constr. 6,030 ft. c. conc. road, 24 ft. wide, Hayfield Twp., T.R. 6-19, Crawford Co. Bids Apr. 6. CD 3/15.

† **American Dredging Co.**, 12 S. 12 St., Phila., Pa. CA **$549,400**. Schuylkill River maintenance dredging, ENG-36-109-55-89, PENNSYLVANIA. U. S. Eng., 2635 Abbottsford Rd., Phila., Pa. CD 3/14, under LB.

BUILDINGS—LB & CA

▲ **A. Friederick & Sons Co.**, Box 273, Watertown, N. Y. LB **$1,144,121**. SCHOOL, BOMBAY-FORT COVINGTON, N. Y. Bombay-Fort Covington Central School, Bombay-Fort Covington, N. Y. Sargent, Webster, Crenshaw & Folley, 2112 Erie Blvd. E., Syracuse, N. Y., archts. Bids Apr. 2.

▲ **Nostrand Building Corp.**, c/o Joseph Riggio, archt., 120-44 Queens Blvd., Kew Gardens, N. Y. Owner Builds. **$2,000,000**. 3 APARTMENTS, on east and west side of Nostrand Ave., between Aves. R and S, BROOKLYN, N. Y.

Rudin Constr. Co., 371 E. 135 St., New York 54, N. Y. CA **$649,647**. (3 bidders) general constr. modernization and conversion of Junior High School 76 to an ELEMENTARY SCHOOL, Blake Ave., Osborne and Watkins Sts., BROOKLYN, N. Y. Bd. Educ., Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. CD 3/6, under LB.

▲ **Hamilton Park Homes**, c/o Lane Realty Co., 107-40 Queens Blvd., Forest Hills, N. Y. Owner Builds. **$6,000,000**. 191 HOUSES, MANHASSET, N. Y.

▲ **Lasker-Goldman Corp.**, 50 E. 42 St., New York 17, N. Y. CA **$7,711,000** (6 bidders) general constr. RECEPTION BLDG. at Manhattan State Hospital, Wards Island, NEW YORK, N. Y. Bureau Contracts & Accounts, The Gov. Alfred E. Smith State Office Bldg., Albany, N. Y. Grand total $9,019,700;
Joseph F. Egan, Inc., 3013 Grand Concourse, New York 58, N. Y. CA **$648,900** (4 bidders) plumbing work (New York, N. Y.);
Progressive Electric Contg. Corp. & Forest Electric Corp., (joint venture), 39-17 24 St., Long Island City, N. Y. CA **$659,800** (7 bidders) electrical work (New York, N. Y.).

▲ **Sherwood Gardens Homes**, c/o Stanley Klein, archt., 89-31 161 St., Jamaica, N. Y. Owner Builds. **$1,800,000**. 60 HOUSES on 15 acre tract at Powell's Lane and Jericho Turnpike, WESTBURY, N. Y.

† **Chisholm Contg. Co., Inc., & Leon Reynolds Constr. Corp.**, P.O. Box 106, Round Lake, N. Y. CA **$598,800**. first phase facility, Proj. S30, 2 story OFFICE and UTILITY BLDG., 1 story WAREHOUSE, misc. site grading, paving, drainage, road maintenance, Knolls Atomic Power Laboratory, Inv. AE-56-SCH-175, WEST MILTON, N. Y. U. S. Atomic Energy Comn., Schenectady Operations Office, P.O. Box 1069, Schenectady, N. Y. Bids Mar. 22. CD 2/21.

Barbco Co., 88-05 76 Ave., Glendale 27, N. Y. CA **$500,000**. paper cup and container PLANT on 9-acre tract near New Jersey Turnpike, CARTERET, N. J. Hudson Pulp & Paper Co., 477 Madison Ave., New York 22, N. Y. CD 1/24.

▲ **William L. Blanchard & Co.**, 45 Poiner St., Newark, N. J. CA Est. **$1,600,000**. 1 story BUILDING for Records Div. on 32 acre tract on Central Ave., NEW PROVIDENCE, N. J. New York Life Insurance Co., 51 Madison Ave., New York 10, N. Y. Frank Grad & Sons, 11 Commerce St., Newark, N. J., archts.

▲ **Frederick Brotherton, Inc.**, 185 Atlantic St., Hackensack, N. J. LB **$1,035,910**. general constr. Morris Hills Regional High SCHOOL addn., ROCKAWAY, N. J. Bd. Educ., Morris Hills Regional High School, Rockaway, N. J. Bids Apr. 5. CD 3/8.

Arthur Venneri, 300 North Ave., Westfield, N. J. LB Est. **$600,010**. MUNICIPAL BLDG., UNION, N. J. Twp. of Union, 881 Suyvasant Ave., Union, N. J. Stephen Potter, 410 Colonial Ave., Union, N. J., archt.

Arthur Venneri, 300 North Ave., Westfield, N. J. CA **$831,000**. general contract HIGH SCHOOL, WATCHUNG, N. J. Bd. Educ., Watchung Hills Regional High School Dist., Watchung, N. J. CD 3/23, under LB.

▲ **Frank H. Wilson Co.**, 125 Coulter Ave., Ardmore, Pa. CA **$1,505,762**. general contract JUNIOR HIGH SCHOOL, GYMNASIUM, parking area, Penn Valley-Narberth Area, ARDMORE, PA. Lower Merion School Dist., Ardmore, Pa. Bids Mar. 27. CD 3/2.

▲ **Frank Facciolo**, Lancaster Pike, Villanova, Pa. Separate Contracts. **$1,500,000**, RESIDENTIAL DEVELOPMENT, 79 units, Cedar Grove Rd., Marple Twp.; Over **$344,000**, RESIDENTIAL DEVELOPMENT, Media Line Rd., Marple Twp., BROOMALL, PA.

▲ **Earl L. Cump, Inc.**, 251 Park Ave., Chambersburg, Pa. CA **$1,500,000**. 1 story, 320x360 ft., brick, steel mfg. PLANT, BURNS CROSSING, PA. Veeder-Root, Inc., 20 Sargent St., Hartford, Conn. Ford Bacon & Davis, Inc., 29 Broadway, New York, N. Y., engr.-archt.

John P. Donovan, 225 S. 15 St., Phila., Pa. CA **$562,240**. SCHOOL addn., RECTORY and CONVENT, CHESTER, PA. St. Robert's R. C. Church, 20 St. and Providence Ave., Chester, Pa. Bids Mar. 21. CD 3/7.

▲ **Whantia Village, Inc.**, c/o Fred Meagher, 225 S. 69 St., Upper Darby, Pa. Separate Contracts. **$1,000,000**. RESIDENTIAL DEVELOPMENT, 100 units, 10 and Ward Sts., CHESTER, PA.

▲ **Wellman Engineering Co.**, 7000 Central Ave., Cleveland, O. CA **$1,300,000**. ORE BRIDGE, CONSHOHOCKEN, PA. Alan Wood Steel Co., Conshohocken, Pa. CD 12/5.

Croyden Homes, Inc., P.O. Box 82, Croydon, Pa. Separate Contracts. **$758,000**. RESIDENTIAL DEVELOPMENT, Croydon Acres, CROYDON, PA.

Lauter Constr. Co., 112 S. 16 St., Phila., Pa. CA **$400,000**. FACTORY, EASTON, PA. Dixie Cup Co., Easton, Pa. Carson & Carson, 16 S. Broad St., Phila., Pa., engrs.

▲ **Harrisburg Div., United Gas Imprvt. Co.**, 14 S. Market St., Harrisburg, Pa. Own Forces. **$1,200,000**. PLANT imprvs. and exten. service lines, HARRISBURG, PA.

▲ **Stephen Shifter**, Haverford, Pa. Separate Contracts. **$1,000,000**. RESIDENTIAL DEVELOPMENT, 53 units, Coopertown Rd., HAVERTOWN, PA.

▲ **Levitt & Sons, Inc.**, Levittown, Pa. Separate Contracts. **$1,584,000**. RESIDENTIAL DEVELOPMENT, 198 units, Middletown Twp., Cobalt Ridge Section, LEVITTOWN, PA.

George Betz & Son, 7501 Central Ave., Phila., Pa. Separate Contracts. **$750,000**. RESIDENTIAL DEVELOPMENT, Valley and Welsh Rds., MEADOWBROOK, PA.

▲ **Melcyn Corp.**, 933 Crosswick Rd., Jenkintown, Pa. Separate Contracts. **$1,100,000**. RESIDENTIAL DEVELOPMENT, 55 units, Lake Shore Dr., NORRISVILLE, PA.

Turner Constr. Co., 1520 Walnut St., Phila., Pa. CA **$500,000**. repair PUBLISHING PLANT, PHILA., PA. The Phila. Bulletin, 30 and Market Sts., Phila., Pa.

Arthur K. Warfield, Media, Pa. Separate Contracts. **$650,000**. RESIDENTIAL DEVELOPMENT, Thornbury Twp., THORTON, PA.

▲ **T. J. Alden**, 41 E. Lancaster Ave., Ardmore, Pa. CA **$1,160,000**. RESIDENTIAL DEVELOPMENT, Pine Tree Rd., WAYNE, PA. John B. Thomson, 125 Coulter Ave., Ardmore, Pa., archt.

▲ **Victor R. Beauchamp, Inc.**, 431 Cedar St. N.W., Wash., D. C. LB **$1,992,299** (10 bidders) Catholic HOME for the Aged, 19 and Eastern Ave., AVONDALE, MD. Archdiocese of Washington, 619 10 St. N.W., Wash., D. C. Bids Apr. 2. CD 3/8.

Mullan Contg. Co., 3945 Greenmount Ave., Baltimore 18, Md. CA **$840,000**. masonry Norwood Elementary SCHOOL, Dundalk, TOWSON, MD. Baltimore Co. Bd. Educ., Aigburth Rd., Towson 4, Md. CD 3/12, under LB.

SOUTH

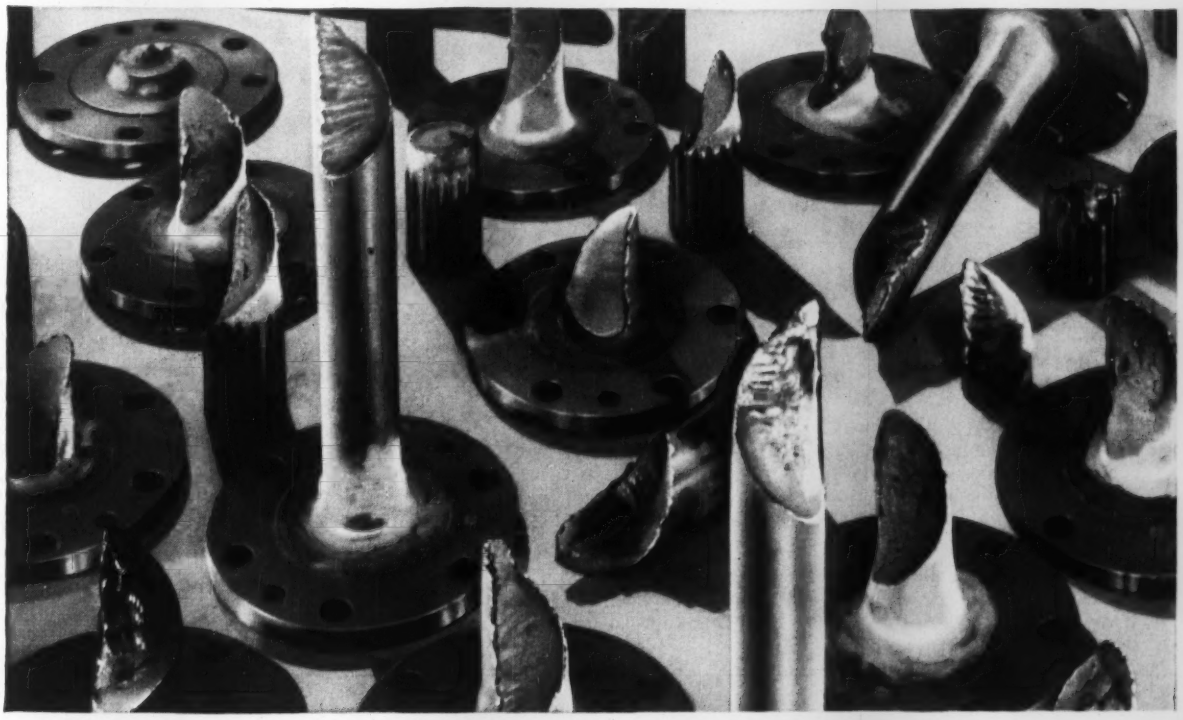
HEAVY CONSTRUCTION—BA

▲ **W. Va., South Charleston**—BA 5/9—Sanitary Bd. of City of South Charleston, City Bldg., Contrs. No. 1 and 2, interceptor storm sewers. $2,000,000. Plans deposit $60. Howard K. Bell, 533 S. Limestone St., Lexington, Ky., engr. CD 3/26.

▲† **S. C., Charleston**—WATERFRONT FACILITIES—BA 5/10—P. Wks. Office, Dpt. Navy, Naval Base, Charleston, waterfront facilities, utilities, Naval Minecraft

(Continued on page 128)

We broke these truck axles in the lab...



In the INTERNATIONAL Engineering Laboratory, axle shafts are tested by twisting them back and forth—hundreds of times—at stress points far beyond those of any normal truck operation. Axle shafts are approved for manufacture only when they withstand a prescribed high number of twists. Production line axle shafts must conform to the quality standards set up by this rigid test.

to save you the BIG money!

Pictured above is a group of once fine and costly INTERNATIONAL axle shafts that have been purposely twisted and broken. This is done to make sure your INTERNATIONAL rear axle will last longer and save you the BIG money—the over-the-years operation and maintenance money.

This rigorous axle-twist test is but one of many operations in the chain of INTERNATIONAL engineering that makes INTERNATIONALS *all-truck*. There are no passenger car compromises *anywhere* in INTERNATIONAL design, no passenger car engines or components asked to do a truck job.

And beyond this big plus of all-truck design, INTERNATIONAL gives you functional, practical, money-saving styling—extra comfortable driver-saving cabs—every modern driving feature.

If you use a truck to make money, see your INTERNATIONAL Dealer or Branch and start saving the BIG money!

Model S-184 LOADSTAR,® GVW 22,000 lbs. In the world's most complete line, there are trucks for every construction job, 4,200 lbs. to 90,000 lbs. GVW, with thousands of variations for exact job specialization.

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INTERNATIONAL® TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Industrial Power
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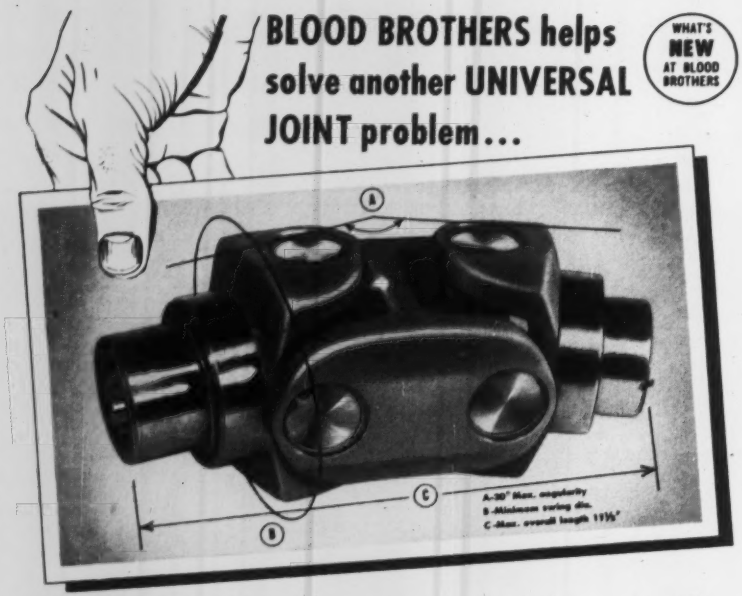

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SOLUTION: The designers sent experimental joints to Blood Brothers' engineers. Alterations were suggested, cutting tooling and production costs considerably.

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FLANGED STRAP-YOKE JOINT

In contrast to the heavy-duty joint above, it suggests the wide range of types and sizes offered manufacturers by Blood Brothers.

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Engineers—Fabricators
Erectors
Structural Steel
BRIDGES and BUILDINGS

General Office and Shops
PHOENIXVILLE, PA.

Subsidiary—Barium Steel Corporation

(Continued from page 126)

Base, NOY 94250. Plans deposit $25. CD 3/8, under LB.

BUILDINGS—BA

▲ **La., Baton Rouge**—HEADQUARTERS—BA 4/30—State Dpt. Hys., Highway Office Bldg., Baton Rouge, 190,000 sq. ft. Hy. Administration Bldg., approx. 4,500 ft. east of State Capitol, S.P. 600-01-15. $3,000,000. Plans deposit $100. Shore & Murrell, 3170 Florida St., archts.

Ky., Covington—SCHOOL—BA 6/1—Bd. Educ., 25 E. 7 St., elementary school, near Madison and Rosina Aves. $950,000. Plans deposit $25. Potter, Tyler, Martin & Roth, 128 E. Sixth St., Cincinnati, O., archts. CD 10/12.

▲ **Fla., Gainesville**—HOSPITAL—BA 6/4—State Bd. Control, J. B. Culpepper, exec. secy., Tallahassee, teaching hospital, J. Hillis Miller Health Center, University of Florida. Total est. $10,000,000. Plans deposit $200. Guy C. Fulton, Bldg. E, Gainesville, archt. CD 8/29/51.

BUILDINGS—SLC

▲ **Fla., Bal Harbor Village**—HOTEL—The Kenilworth Hotel, Inc., 10205 Collins Ave., soon lets contract, 8 story, bsmnt, 75x140 ft. Kenilworth House, 102nd St. and Collins Ave. $1,000,000. Roy F. France & Son, 1620 West Ave., Miami Beach archt. Sasnett Engr. Inc., 561 N. E. 79 St., Miami Beach, mech. engr. H. J. Ross Assocs., 3047 Biscayne Blvd., Miami, structural engrs.

HEAVY CONSTRUCTION—LB & CA

† **Porter Constr. Co.**, 5104 Baltimore Ave., Hyattsville, Md., LB $856,637. (9 bidders) heliport facilities and hangar at Davison Army Airfield, ENG-49-080-56-35-(37), and ENG-49-080-56-37-(38), FORT BELVOIR, VA. U. S. Eng., 1st and Douglas Sts. N.W., Wash. 25, D. C. Bids Apr. 3. CD 3/9.

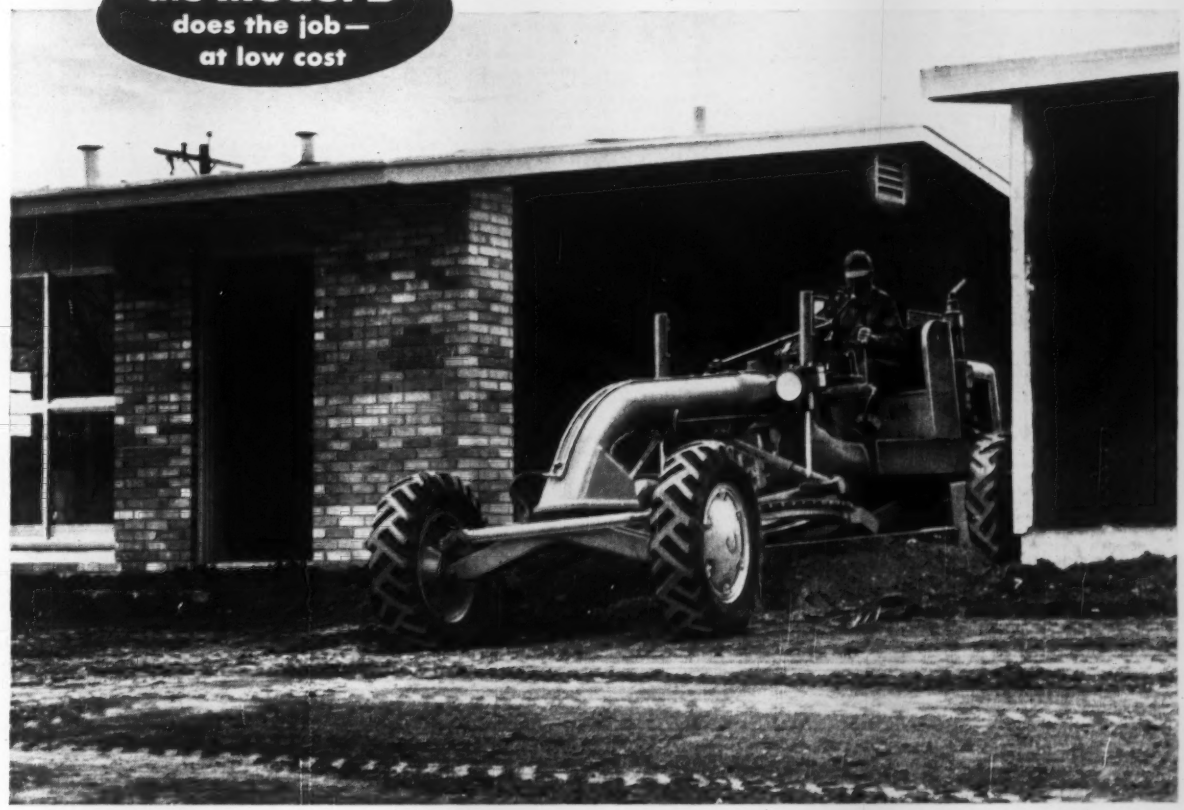
† **Bay Constr. Co.**, 2808 Cromwell Rd., Norfolk, Va., CA $755,284, Fleet Airborne Electronics Training Unit Bldg., Naval Air Station, NOy 89490, Spec. 47347, NORFOLK, VA. P. Wks. Office, Fifth Naval Dist., U. S. Naval Base, Norfolk 11, Va. Bids Mar. 27. CD 4/3, under LB.

FLORIDA—State Road Dpt., Tallahassee,
Brinson Constr. Co., Box 2209, Tampa, Fla., LB $595,470, (2 bidders) Sarasota pass, Perico Bayou and Palma Sola Bay Bridges approaches, SR 64, Job 1315-175, Contract 11, Manatee Co. Bids Apr. 3. CD 3/21.

▲ **FLORIDA**—State Road Dpt., Tallahassee,
Fla.—**Brinson-Allen Constr. Co.**, Box 1456, Tampa, Fla., LB $123,306, (5 bidders) grading roadway, 3.7 mi. SR S-29, Chokoloskee to Everglades City, Job No. 0360-150, Collier Co.; LB $91,043, (7 bidders) reworking existing base; constr. new 6 in. lime rock base; Type II b. conc. surf. course, 2.396 mi. SR S-664 and S-664-A, FAP Nos. S-268 (2) and S-305 (2), Jobs Nos. 0652-252 and 0656-250, Hardee Co.;
Fla.—**Doyle Pope**, Quincy, Fla., LB $95,380, (3 bidders) sand asph. hot mix; Type II b. conc. surf. course, etc. 1.675 mi. SR 30 to Watson Bayou via Cove Blvd. and Cherry St. Job No. 4600-104, Panama City, Bay Co.; LB $134,533 (5 bidders) 6 in. sand clay base; Type 2 surf. tr. 7.968 mi. SR S-271, between SR 12 and point on Torreya State Park, FAP No. S-146 (2), Job No. 5655 and (250) State Job No. 5655-150, Liberty Co.;
Fla.—**W & M Constr. Co.**, Williston, Fla., LB $82,673, (4 bidders) limerock stabil. base; Type 2 surf. tr., 3.543 mi. from SR 10 in Madison southwesterly to SR 360, State Proj. Job No. 3556-150, SR S-360-A, Madison Co.; LB $104,251, (9 bidders) light excavation; 6 in. limerock stabil. base; Type 2 surf. tr., etc. 6.351 mi. SR 23 northeast to Lake Butler southeast, Job No. 3962-175, SR S-237, Union Co.;
Fla.—**W. H. Armston Co., Inc.**, Dunedin, Fla., LB $109,871, (6 bidders) grading roadway; rework and widen existing Marl Base; Type 2 surf. tr. 11.136 mi. Collier County line east and north, Job No. 0751-152, SR S-846, Hendry Co.;
Fla.—**Cone Bros. Constr. Co.**, Box 1301, Tampa, Fla., LB $305,975, (4 bidders) Type I b. conc. surf. course and binder course 17.163 mi. SR 600, Jobs Nos. 1003-111 and 1010-106, Hillsborough Co.;
Fla.—**J. D. Manly Constr. Co.**, Box 586, Leesburg, Fla., LB $935,238, (7 bidders) 8 in. limerock base, Type I b. conc. surf. course with binder course 7.395 mi. SR 15 and 600 between Orange Co. line and point approx. 7.4 mi. north, FAP No. F-010-1 (5), Job No. 7701-203, State Job No. 7701-112, Seminole Co.;
Fla.—**Scott Constr. Co.**, Thomasville, Ga., LB $621,670, (5 bidders) 6 in. sand clay base, Type 1-A surf. tr.; Type II b. conc. surf. course; concrete box culverts, extens.; constr. 2 prestressed concrete deck girder bridges on concrete pile bents; 144 ft. and 216 ft. respectively 6.231 mi. SR 95, Sections between Bogia and South Flomaton, Job No. 4806-106, Escambia Co.;
Fla.—**S. M. Wall Co. & S. M. Wall**, Gainesville, Fla., LB $757,778 (3 bidders) grading; 8 in. limerock base; Type I b. conc. surf. course with binder course; storm sewers; constr. 120 ft. concrete slab deck bridge on concrete pile bents 4.387 mi. SR 26 on University Ave. in Gainesville from point near SR 24 west to SR 26, Job No. 2507-107; SR 26 and 20 on University Ave. in Gainesville from N.E. 12 St. to S.E. 15 St. and on SR 20 from S.E. 14 St. to S.E. 15 St., Job No. 2608-103, Alachua Co.;
Fla.—**Caddell & Jackson**, Box 2217, Jacksonville, Fla. LB $79,681, (3 bidders) S.B.R.M., etc. 3.505 mi. SR S-109, Fort Caroline Rd. from St. Johns Bluff Rd. northeast, Job No. 7285-153, Duval Co.;
Fla.—**Sword Bros.-McDougal Co., Inc.**, Vero Beach Fla., LB $107,628, (8 bidders) grading, limerock base; rework and widen existing rock base; Type 2 surf. tr.

(Continued on page 130)

the Model D does the job— at low cost



"Never lets me down"

says Everett Datton, San Antonio, Texas, about the Allis-Chalmers Model D Motor Grader.

It's two homes a day, out Texas way—as Quincy Lee Construction Company works on a big-scale project of building 1400 new homes in two years.

One of the machines on the job is an Allis-Chalmers Model D motor grader used to grade roads, landscape homes and build driveways. Owner Quincy Lee says this about his Model D: "I'm very happy with it. It does a very fine job for us." Operator Everett Datton says,

"I like the Model D. It gets in and out of tight spots, especially where buildings are close together. With the D's fine control I can work between newly-planted trees and close to sidewalks without damaging trees or chipping cement. Not only is this machine good at fine grading, but its diesel engine has plenty of power for handling full capacity loads. I run it 9 hours a day, 5½ days a week. *She never lets me down.*"

• • •

Quincy Lee and Everett Datton are confirming what thousands of other Model D operators and owners know. In its class, you just can't beat the D for sure-fire performance at low cost. Watch it in action and you'll be amazed how the D's right combination of weight, power and traction lets it handle a wide range of jobs. And you can choose either diesel or gasoline engine models, plus number of attachments—including rear-mounted ⅜-yd loader and midship-mounted hydraulic scarifier, to increase the Model D's usefulness and efficiency.

See the Model D now at your Allis-Chalmers construction machinery dealer—headquarters for factory-trained servicemen, factory-approved facilities and True Original Parts.

Model D
50 belt hp diesel or gasoline engine

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

(Continued from page 128)

5.53 mi. SR S-607, St. Lucie Co. line to SR 60. Job No. 8857-150, Indian River Co.;

Fla.—**W. L. Cobb Constr. Co.,** Box 977, Tampa, Fla., LB **$246,314,** (6 bidders) grading roadway; 6 in. limerock base; Type 2 surf. tr.; storm sewers 1.114 mi. streets in Okeechobee, Job No. 9153-152, Okeechobee Co. Bids Apr. 3. CD 3/20.

▲† **Duval Eng. & Contr. Co.,** Box 1588, Jacksonville, Fla., CA **$1,581,306.** airfield pavements and bore sight range, Naval Air Station, Cecil Field, NOy 94249, Spec. 49793, JACKSONVILLE, FLA. P. Wks. Office, Sixth Naval Dist., Bldg. 12, Charleston, S. C. Bids Mar. 14, awarded Apr. 3. CD 3/29, under LB.

▲ **Gust K. Newberg Constr. Co.,** 99 N.E. 71 St., Miami, Fla. LB **$5,627,000.** 20 Street Terminal Bldg., Miami International Airport, MIAMI, FLA. Bd. Comrs. Dade Co., Court House, Miami, Fla. Bids Apr. 3. CD 3/9.

▲ **Farnsworth & Chambers Co.,** Inc., 3018 Leeland St., Houston, Tex., LB **$3,073,000,** est. $3,000,000. sewage treatment plant, NASHVILLE, TENN. City, City Hall, Nashville, Tenn. CD 3/28/52.

BUILDINGS—LB & CA

▲ **R. R. Richardson & Co.,** 25 and Newport Ave., Norfolk, Va., LB **$1,323,857.** HOSPITAL alterations, addns., NORFOLK, VA. St. Vincent DePaul Hospital, Granby St. and Kingsley Lane, Norfolk, Va. Bids Apr. 4. CD 3/6.

▲ **Moyer Bros.,** 5 Justice Row, Charleston, W. Va., LB **$1,594,000** Charleston CIVIC CENTER, CHARLESTON, W. VA. City, City Bldg., Charleston 1, W. Va. Bids Apr. 5.

▲ **L. W. Ross,** 2980 McFarlane Rd., Coconut Grove, Miami, Fla., LB **$1,000,000,** 90-unit APARTMENT, "Fiesta Towers", Madeline Ave., FORT LAUDERDALE, FLA. Fiesta Development Co., c/o Charles F. McKirahan, archt., 2400 E. Oakland Park Blvd., Fort Lauderdale, Fla. Bids Mar. 3. CD 3/14.

Tudor Constr. Co., P. O. Box 1232, Alexandria, La. CA **$698,762.** white female RECEIVING UNIT for Central Louisiana State Hospital, Proj. No. 1-5, PINEVILLE, LA. State Bldg. Auth., State Capitol, Baton Rouge, La. CD 4/3, under LB.

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

April 25 Michigan

STREETS AND ROADS

April 25 Michigan

O., **Cincinnati**—BA 5/1—Bd. Comrs. Hamilton Co., Court House, sewage treatment plant for Sycamore Dist., near Remington. $457,000. Geo. Lemmel, co. engr. CD 11/5/54.

BUILDINGS—BA

▲ Ill., **Chicago**—CHURCH—BA 4/25—Queen of All Saints Church, Sauganash and Kedzie Aves., church. $1,500,000. Meyer & Cook, 1915 N. Lincoln Ave., archts. CD 11/2.

▲ Ill., **Skokie**—SCHOOL—BA 5/2—School Dist. 65, 1323 Hinman Ave., Evanston, College Hill Grade School addn., new elementary school, Davis and Samoset Blvd. $1,070,000. Ganster & Henninghausen, 222 Washington St., Waukegan, archts.

▲ Wis., **Fond du Lac**—HOME FOR AGED—BA 5/2—Fond du Lac Co., Court House, home for aged. $1,100,000. Sylvester J. Stepnoski, 25 Merrill Ave., archt. CD 9/9/54.

O., **Athens**—CHURCH—BA 5/8—First Methodist Church, Athens, church. $650,000. Plans deposit $25. Potter, Tyler, Martin & Roth, 128 E. 6 St., Cincinnati, archts. Beineke & Ruehlman, 626 Broadway, Cincinnati, engrs. CD 6/30.

▲ O., **Athens**—DORMITORY—BA 5/8—Ohio University, Athens, Dormitory No. 11 on campus grounds. $1,750,000. Plans deposit $25. Potter, Tyler, Martin & Roth, 128 E. 6 St., Cincinnati, archts. I. C. Disher, 216 E. 9th St., Cincinnati, engr. CD 6/30.

▲ Wis., **Milwaukee**—SCHOOL—BA 5/24—School Bd., 1111 N. 10 St., Zone 3, West Division High School. $3,000,000. Maynard W. Meyer & Assocs., 424 Wells St., archts. CD 3/14.

BUILDINGS—SLC

Ill., **Chicago**—CHURCH, etc.—Holy Rosary R. C. Church, 108th and Perry Sts., soon lets contract, church and rectory. $500,000. J. Ellsworth Potter, Schofield Bldg., Cleveland, O., archt.

HEAVY CONSTRUCTION—LB & CA

▲ **OHIO**—State Hy. Dpt., Columbus, Zone 19,

O.—**General Asphalt Paving Co.,** 500 Main Ct. S.E., Canton, O., LB **$314,855,** est. $405,000 (8 bidders) Type T-35, 3.165 mi. SR 80-(0.00-0.74), 1.01, F-678 (3), Carroll and Tuscarawas Counties;

O.—**Fischer Constr. Co.,** 4053 Clifton Ave., Cincinnati, O., LB **$3,863,807,** est. $4,282,300 (10 bidders) Type T-71 and structures 6.573 mi. USR 25-13.13, IN-196 (4), Miami Co.;

O.—**Union Asphalt Materials Co.,** R. D. 2, Ostrander, O., LB **$85,480,** est. $86,200 (5 bidders) Type T-35, 3.778 mi. USR 23-0.00, Delaware Co.;

O.—**Philip Skinner,** Route 1, Bethesda, O., LB **$155,754,** est. $202,900 (4 bidders) Type T-32 and structures SR 646 (2.11-3.47), Jefferson Co.;

O.—**The Newark Asphalt Paving Co.,** West Poplar Ave., Newark, O., LB **$80,644,** est. $93,700 (3 bidders) Type T-35, 5.344 mi. SR 13-(3.78-8.28), Knox Co.;

O.—**Kane, O'Horo & Haenny, Inc.,** 65 W. Indianola Ave., Youngstown, O., LB **$178,871,** est. $197,900 (2 bidders) Type T-35 on B-20 0.655 mi. USR 62-(8.97-9.67), Trumbull Co.;

O.—**Ohio Road Paving Co.,** 30 E. Broad St., Columbus, O. LB **$116,215,** est. $119,342 (1 bidder) Type T-35, 13.40 mi. Ashtabula and Trumbull Counties;

O.—**The City Asphalt & Paving Co.,** 120 Pike St., Youngstown, O., LB **$89,364,** est. $95,0.1 (1 bidder) Type T-35 11.87 mi. Columbiana and Mahoning Counties;

O.—**W. P. McCarren Co.,** Walhonding, O., LB **$82,236,** est. $75,472 (2 bidders) Type T-35, 15.27 mi. Coshocton and Knox Counties;

O.—**The Wm. L. Schloss Paving Co.,** 9521 Woodland Ave., Cleveland, O., LB **$104,313,** est. $107,778 (1 bidder) Type T-35, 14.17 mi. Geauga and Lake Counties;

O.—**George W. Van Camp,** 1121½ South Court St., Circleville, O., LB **$81,254,** est. $74,853 (1 bidder) Type T-30, T-35, 14.59 mi. Pickaway Co.;

O.—**H. and S. Inc.,** 124 Wentz St., Tiffin, O., LB **$95,996,** est. $111,023, Type T-30, T-31, T-32, 38.14 mi. Crawford, Erie and Huron Counties. Bids Apr. 3. CD 3/15.

▲ **ILLINOIS**—State Div. Hys., Centennial Bldg., Springfield,

rejected bids Mar. 9, 5-span steel girder bridge, FA Rte. 155, Greene and Jersey Counties, LB **$112,320;** furnishing steel for 13-span bridge over Illinois River in Peru, LaSalle Co., LB **$1,084,515;** East Dubuque approaches 0.13 mi. to Mississippi River Bridge, SBI 5, Jo Deviees Co., LB **$136,601;** 7-span steel bridge, FAS Rte. 719, Clay Co., LB **$143,295;** widen bridge, FA 168, Rock Island Co., LB **$100,830.** CD 3/14.

▲ **Anthony Pontarelli & Sons,** 6200 N. Kilpatrick St., Chicago, Ill., LB **$1,300,385.** auxiliary outlet sewers, central southside sys., CHICAGO, ILL. City, City Hall, Chicago, Ill. CD 1/25/52.

Sugden & Sivier, Inc., 13100 Cloverdale St., Oak Park, Mich. CA **$823,355.** concrete water main, Inkster Rd. from Michigan Ave. to 500 ft. south of Wabash R.R., DETROIT, MICH. Bd. Rd. Comrs. Wayne Co., City-County Bldg., Detroit, Mich. Bids Mar. 26. CD 3/15.

Rocco Ferrera Boam Co., Inc., 30105 W. 8 Mile Rd., Livonia, Mich. CA **$529,839.** first phase storm sewers, 45,000 lin. ft. 10- to 48-in. concrete sewer mains, MUSKEGON, MICH. City, A. J. Leutscher, city clk., Muskegon, Mich. Bids Mar. 20. CD 3/9.

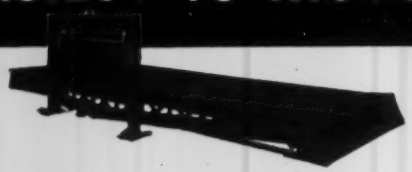
BUILDINGS—LB & CA

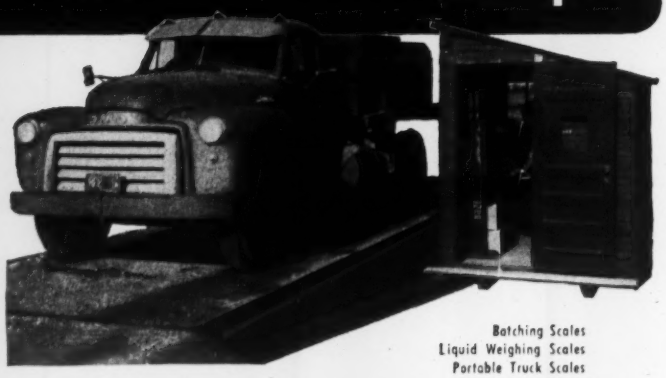
Dushell Eng., Inc., Wichita, Kan., CA **$700,000.** bit. processing PLANT, platformer-unifiner unit, GARY, IND. Berry Asphalt Co., Industrial Hy., Gary, Ind.

▲ **Gibbs & Hill, Inc.,** Penn Station, New York, N. Y. CA Est. **$15,000,000.** design and supervise construction, 105,000 kw. addn. Hardinong Street Steam

(Continued on page 133)

PROOF! Thurman PORTABLE truck scales *EASIEST* to move! need *NO* concrete pit!





Just winch your Thurman *Portable* on to a truck bed and take it with you from job to job. Accuracy and dependability have been built-in, to stay. Once at the site, choose a level area, place the scale and ramp earth at both ends. Trucks move on and off easily. You save on expensive concrete pit installations and weighing costs.

CAPACITIES: 20 to 50 ton, **DECK lengths: 18 to 43 ft.**

Write today for Bulletin 601.

Batching Scales
Liquid Weighing Scales
Portable Truck Scales
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Wheelbarrow Scales
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THURMAN

Precision Products since 1918

THURMAN MACHINE COMPANY, DEPT. E 156 N. 5th STREET, COLUMBUS, OHIO

Prepakt method simplifies deep mine concreting

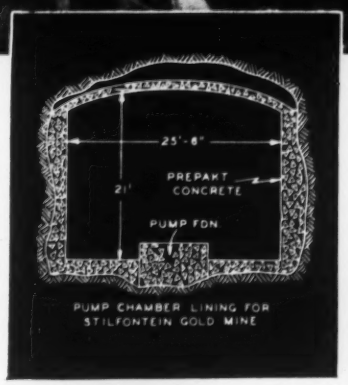
Cost savings, fewer production interruptions, faster placement reported on two projects

A new INTRUSION-PREPAKT technique now overcomes many of the problems which have limited the use of concrete in deep mines. Conventional concreting, which requires lowering equipment and materials to the job, is expensive and interferes with mine operations.

Use of PREPAKT concrete, made by consolidating preplaced aggregate with INTRUSION mortar, simplifies placement. Waste mine rock from excavation can be used for the aggregate. INTRUSION mortar can be batched, mixed and gravity fed from a surface plant through 1½" lines to underground pumps for transfer to forms. No shaft time is needed for any concreting materials and extensive use of mine cars is eliminated.

This PREPAKT method was employed for placing pump chamber linings in two South African gold mines. The results: savings in time and cost were realized; production interruptions were avoided; and the PREPAKT concrete was of excellent quality—dense, impermeable, attractive. Its tight bond to the rock face eliminated need for crown grouting.

This is added proof that INTRUSION-PREPAKT's fresh approach to foundation and structural concrete problems usually saves dollars and days. Call us on your next new construction or maintenance project. INTRUSION-PREPAKT, Inc., Room 779-J, Union Commerce Bldg., Cleveland 14, Ohio. In Canada: INTRUSION-PREPAKT, Ltd., 159 Bay St., Toronto, Ontario.



PUMP CHAMBER LINING FOR STILFONTEIN GOLD MINE

3060-foot level—Some 1300 cu. yds. of PREPAKT concrete were used to line floor, walls and ceiling of 175-foot long pump chamber at Stilfontein Gold Mine, Transvaal. All aggregate was waste mine rock.

5320-foot level—At Loraine Gold Mine, Orange Free State, 370 cu. yds. of economical, high quality PREPAKT concrete were placed for pump chamber lining. INTRUSION-PREPAKT admixes permitted gravity feeding of mortar from surface to 5320-foot level.

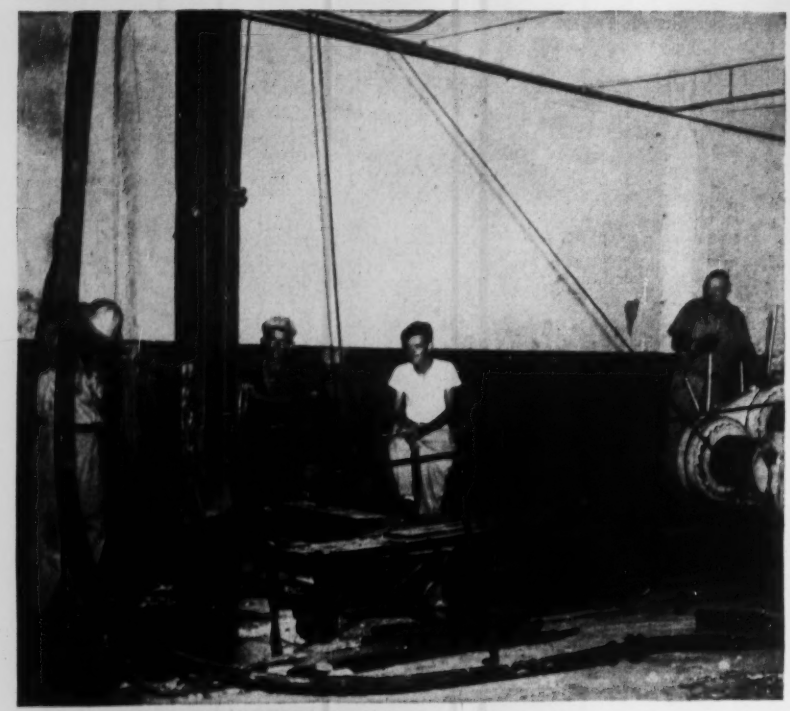
INTRUSION-PREPAKT, INC.

OFFICES IN PRINCIPAL U. S. AND FOREIGN CITIES

Intrusion and Prepakt are trade marks of Intrusion-Prepakt, Inc., whose methods and materials are covered by U. S. Patents Nos. 2313110, 2655004, 2434302 and others, also patents pending.

A new $7,000,000 six-story court house and jail was to be built for Duval County, Florida. The contractor, The George D. Auchter Company of Jacksonville, had to obtain test pile information to determine subsurface conditions prior to the demolition of an existing building on the site.

It looked like a tough job, but it didn't feaze the contractor's organization—they had successfully handled similar jobs requiring foundation tests inside buildings.



A Tough Driving Job

accomplished with the help of a McKiernan-Terry Pile Hammer

Mr. A. W. Avent, Vice President of Auchter, reports that the job was accomplished by driving 4 test piles by means of a McKiernan-Terry 9B3 Double-Acting Pile Hammer which, incidentally, had given good service ever since it was purchased in 1946.

The illustrations show, top to bottom, the McKiernan-Terry Hammer on the third floor of the existing building, the control leads from the winch on the second floor, and a portion of the test piling as it goes through the ground floor.

You, too, can depend upon McKiernan-Terry pile-driving equipment for successful results on your own pile-driving jobs. Write for bulletins describing the extensive McKiernan-Terry line of pile hammers, pile extractors, pile hammer leads and accessories.

McKIERNAN-TERRY CORPORATION

MANUFACTURING ENGINEERS

80 RICHARDS AVE., DOVER, NEW JERSEY

PLANTS AT HARRISON, N. J. AND DOVER, N. J.

MK-374

(Continued from page 130)

GENERATING PLANT, INDIANAPOLIS, IND. Indianapolis Power & Light Co., 17 N. Meridian St., Indianapolis, Ind. CD 12/19.

▲ **Mercury Builders,** 5412 W. North Ave., Chicago, Ill., LB $2,554,771. (a) new HIGH SCHOOL, SWIMMING POOL and GYMNASIUM (b) HIGH SCHOOL addn., macad. paving, CALUMET CITY and LANSING, ILL. School Dist. 215, Superior Ave. and Pulaski Rd., Calumet City, Ill. Bids Mar. 29. CD 2/29.

▲ **Carl E. Erickson Co.,** 4657 N. Ravenswood St., Chicago, Ill. CA Est. $1,300,000. 7 story APARTMENT, 72 suites, 2300 N. Commonwealth Ave., CHICAGO, ILL. Owner, c/o Hirschfield & Pawlan, archts., 327 S. LaSalle St., Chicago 4, Ill. Bids Mar. 12. CD 3/9.

▲ **M. J. McDermott Co.,** 30 N. LaSalle St., Chicago 1, Ill., LB $1,878,918, RECEIVING BLDG. addn., CHICAGO, ILL. Cook County Hospital, 1835 W. Harrison St., Chicago, Ill. CD 4/28/52.

▲ **Coath & Goss, Inc.,** 5103 W. Lake St., Chicago, Ill., LB $2,079,521. AUDITORIUM, swimming pool, LIBRARY and BOILER HOUSE addn., EVANSTON, ILL. Evanston Twp. High School Dist. 202, 1600 Dodge St., Evanston, Ill. Perkins & Will, 309 W. Jackson Blvd., Chicago, Ill., archts.

Jolerich Constr. Co., 105 Earl Ave., Joliet, Ill. Own Forces. $875,000. 50 HOMES, JOLIET, ILL.

▲ **Collins Builders,** 5231 Lincoln St., Skokie, Ill. Own Forces. $1,000,000. 50 HOMES, SKOKIE, ILL.

▲ **Conzelman-Ryan, Inc.,** 523 S. Sheridan Rd., Waukegan, Ill. Own Forces. $1,125,000. 75 HOMES, WAUKEGAN, ILL.

▲ **Siesel Constr. Co.,** 514 E. Ogden Ave., Milwaukee, Wis., LB $2,803,434, RESIDENT HALL, MILWAUKEE, WIS. Marquette University, 615 N. 11 St., Milwaukee 3, Wis. Bids Apr. 9. CD 3/6.

▲ **Bryant & Detwiler Co.,** 2110 Penobscot Bldg., Detroit, Mich. CA Est. $7,000,000. 450,000 sq. ft. OFFICE, Southfield and Rotunda Sts., DEARBORN, MICH. Ford Motor Co., J. A. MacAlarney, dir. Plant Eng., P. O. Box 117, Dearborn, Mich. CD 1/12.

▲ **Edward Rose & Sons,** 14900 Linwood St., Detroit, Mich. Owner Builds. $1,500,000. Van Born Meadows, 107 HOUSES, Gulley and Pennie Rds., DEARBORN, MICH.

▲ **Darin & Armstrong, Inc.,** 2041 Fenkell St., Detroit, Mich. CA $603,000. construction contract Mistersky STATION, DETROIT, MICH. City, Pub. Lighting Comn., 174 E. Water St., Detroit, Mich. CD 9/26;
Pittsburgh Piping & Equip. Co., 158 49 St., Pittsburgh, Pa. CA $807,700. mechanical work (Detroit, Mich.).

▲ **Edward Rose & Sons,** 14900 Linwood St., Detroit, Mich. Owner Builds. $2,100,000. Ecorse Meadows Subdivision, 175 brick HOMES, Dix and Eureka Rds., ECORSE, MICH.

▲ **Edward Rose & Sons,** 14900 Linwood St., Detroit, Mich. Owner Builds. $6,000,000. 400 brick HOMES, Middlebelt and Nine Mile Rd. Sect., FARMINGTON, MICH.

Wm. M. Johnson Co., Flint, Mich., CA $635,820, plus $2,000. general constr. SENIOR COLLEGE BLDG., FLINT, MICH. City, George D. Stevens, secy. Bd. Educ., Flint, Mich. CD 3/30, under LB.

▲ **Combustion Engineering, Inc.,** 1537 Book Bldg., Detroit, Mich. CA $1,300,371. boiler for Moores Park POWER STATION expansion, 44,000 kilowatt generator turbine, LANSING, MICH. City, Otto E. Eckert, mgr. Municipal Lighting Bd., 116 W. Ottawa St., Lansing, Mich. Burns & Roe, Inc., 233 Broadway, New York, N. Y., engr. Grand total $1,564,261, CD 1/28/55;
Pacific Pumps, Inc., 2842 W. Grand Blvd., Detroit, Mich. CA $119,748. boiler feed pumps (Lansing, Mich.);
Aerotec Corp., 5538 Cass St., Detroit, Mich. CA $144,142. electric precipitator (Lansing, Mich.).

▲ **Edward Rose & Sons,** 14900 Linwood St., Detroit, Mich. Owner Builds. $3,500,000. Livonia Meadows 250 brick HOMES, Inkster and Six Mile Rds. Sect., LIVONIA, MICH.

▲ **W. E. Wood Co.,** 4649 Humbolt St., Detroit, Mich. CA 1 story, 1,300,000 sq. ft. assembly PLANT, Farmington Brighton Expressway, NOVI (Wixom), MICH. Total est. $25,000,000. Lincoln Div., Ford Motor Co., Ben D. Mills, 6200 W. Warren St., Wayne, Mich. CD 1/23;
Long Constr. Co., Rialto Bldg., Kansas City, Mo. CA 3 story, 200,000 sq. ft. OFFICE (Novi, Mich.).

▲ **Kaufman & Wolf Associates,** Cadillac Tower, Detroit 26, Mich. Owner Builds. $2,000,000. SHOPPING CENTER, DEPARTMENT STORE and 25 SHOPS, parking space, etc., TROY, MICH.

▲ **Kaufman & Wolf Associates,** Cadillac Tower, Detroit 26, Mich. Owner Builds. $3,000,000. 200 brick HOMES, 40 acre site, Maple and Livernois Sts., TROY, MICH.

Congress Constr. Co., 2980 W. Davison St., Detroit, Mich. Owner Builds. $750,000. 50 brick HOUSES, Ryan and Mound Rds., WARREN, MICH.

▲ **Congress Constr. Co.,** 2980 W. Davison St., Detroit, Mich. Owner Builds. $2,000,000. SHOPPING CENTER, 25 stores, 13 Mile and Mound Rds., WARREN, MICH.

Edward Rose & Sons, 14900 Linwood St., Detroit, Mich. Owner Builds. $700,000. Green Farms Subdivision, 60 brick HOMES, Ryan St. sect., WARREN, MICH.

WEST OF MISSISSIPPI

HEAVY CONSTRUCTION—BA

Mo., St. Louis—BA 5/8—City, Frank J. McDevitt, pres. Bd. P. Service, 304 City Hall, 12 Blvd. and Market St., Zone 3, reconstr. coagulant house and constr. new chemical treatment wing at Chain of Rocks Water Works Pumping Station on Mississippi River, north end of city, $912,000, R. W. Booker & Assoc., 1722 Olive St., Zone 3, engrs. CD 12/15/54.

BUILDINGS—BA

Wyo., Buffalo—HIGH SCHOOL—BA 5/1—Johnson Co. High School Dist., Buffalo, Johnson County High School addns., alterations, incl. new gymnasium, $500,000. Plans deposit $50. Vernon Drake, Empire Bldg., Billings, Mont., archt. Bids Mar. 23 rejected, LB $422,000. CD 4/5, under LB.

Iowa, Mount Vernon—LIBRARY, etc.—BA 5/2—Cornell College, Mount Vernon, library and student social center, $750,000. H. R. Green Co., 417 1 Ave. S. E., Cedar Rapids, archt.-engr. CD 10/26.

N. D., Williston—HIGH SCHOOL—BA 5/3—Bd. Educ., Williston, high school. $700,000. Wells & Denbrook, 425 Kittson Ave., Grand Forks, archts. CD 11/25.

N. D., Grand Forks—ARMORY, AUDITORIUM—BA 5/4—City and N. D. National Guard, Bismarck, armory and auditorium. $500,000. Wells & Denbrook, 425 Kittson Ave., archts. CD 11/10.

▲ **Wyo., Laramie**—LIBRARY—BA 5/4—University of Wyoming, Laramie, library bldg. with American Studies School Wing. $1,750,000. Hitchcock & Hitchcock, 107 S. 5 Ave., assoc. archts. Porter & Bradley, 1009 E. Lincolnway, Cheyenne, archts. CD 1/10.

Mo., St. Joseph—SCHOOL—BA 5/8—Bd. Educ., St. Joseph, Myrtle Miller School. $500,000. Boschen & Herschman, St. Joseph, archts. CD 7/18.

▲ **Tex., Beaumont**—PLANT—Bids Asked—Alco Products, 1400 Crockett St., plant expansion, remodel existing shops. $1,500,000. Lacey, Atherton & Davis, Hotel Sterlig, Wilkes Barre, Pa., and George J. Schaumburg, 2678 Laurel St., Beaumont, Tex., engrs. CD 3/26.

BUILDINGS—SLC

Kan., Hutchinson—NEWSPAPER—Hutchinson News Herald, J. P. Harris, pres., Hutchinson, soon lets contract newspaper bldg. $575,000. McCrackin & Hiett, Hutchinson, archts. CD 2/2.

HEAVY CONSTRUCTION—LB & CA

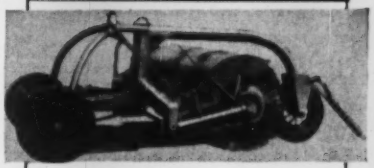
American Bridge Div. U. S. Steel Corp., 629 S.E. Second St., Minneapolis, Minn. LB $596,963. (3 bidders) furnish, erect fabricated structural steel for Lowry Ave. Bridge over Mississippi River about 830 lin. ft., 5 trusses, MINNEAPOLIS, MINN. City, L. A. Johnson, clk., Minneapolis, Minn. Bids Apr. 6. CD 11/18, under CA.

▲ **IOWA**—State Hy. Comn., Ames,
Iowa—**Fred Carlson Co.,** Decorah, Iowa, LB $202,463, c. conc. 2.144 mi. FN-730 (8), Humboldt Co.;
Iowa—**Jensen & Krage,** 2220 Hawkeye Dr., Sioux City, Iowa., LB $183,133, c. conc. 1.238 mi. U-38 (10), Plymouth Co.; LB $75,095, c. conc. 0.64 mi. F-38 (13), Plymouth Co.; LB $123,012, c. conc. 0.557 mi. F-275 (3), Plymouth Co.;
Iowa—**Booth & Olson, Inc.,** 529 Insurance Exchange Bldg., Sioux City, Iowa, LB $1,049,078, c. conc. 11.54 mi. F-773 (3), Pottawattamie Co.; LB $118,038, c. conc. pavement wid'n. 0.759 mi. UN-721, Carroll Co.;
Iowa—**Western Eng. Co.,** Harlan, Iowa., LB $202,046, b. conc. 7.318 mi. I-56, Clay Co.; LB $78,329, b. conc. 3.248 mi. CO-156-Emmet Co.; LB $152,444, b. conc. 7.082 mi. S-301 (5), Emmet Co.;
Iowa—**Jay W. Craig,** 1814 N.E. California St., Minneapolis, Minn., LB $133,502, b. conc. 7.883 mi. S-796 (2), Hancock Co.; LB $152,929, b. conc. 8.167 mi. S-885 (4), Hancock Co.;
Iowa—**Everds Bros.,** Algona, Iowa, LB $156,813, b. conc. 8.61 mi. S-745 (7), Kossuth Co.;
Iowa—**Stade Constr. Co.,** Fairmont, Minn., LB $604,644 b. conc. 11.111 mi. F-767 (4), Mills and Pottawattamie Counties; LB $651,162, b. conc. 9.266 mi. F-773 (4), Pottawattamie Co.; LB $150,435, b. conc. 1.609 mi. F-773 (5), Pottawattamie Co.;
Iowa—**Lee & Johnson, Inc.,** 215 Insurance Exchange Bldg., Sioux City, Iowa, LB $76,236, b. conc. pavement 2.647 mi. S-733 (5), Lyon Co.;
Iowa—**A. Olson Constr. Co.,** 1225 Commercial St., Waterloo, Iowa, LB $77,888, c. conc. pavement wid'n 0.112 mi. UN-305, Dubuque Co.;
Iowa—**Orville Eblen Constr. Co.,** Atlantic, Iowa, LB $206,533, grading 12.529 mi. FN-773, Cass and Pottawattamie Counties;
Iowa—**Mickle & Ross Constr. Co.,** Newton, Iowa, LB $376,101, grading 2.147 mi. U-17 (5), Dubuque Co.; LB $229,405, grading 0.255 mi. U-UG-17 (6), Dubuque Co.;
Iowa—**Ira Von Buskirk & Sons,** Howarden, Iowa, LB $79,479, grading 7.537 mi. FN-210 Plymouth Co.; LB $337,321, grading 10.765 mi. FN-886, Plymouth and Woodbury Counties. Bids Apr. 3. CD 3/23, 3/26.

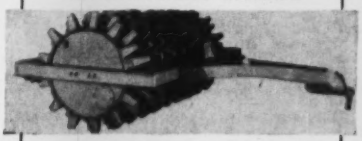
† **C. Harris Co.,** 229 Ohio St., St. Paul, Minn., CA $728,200, const. Group 2 buildings, Minot Air Force Base, ENG-25-066-56-18, MINOT, N. D. U. S. Eng., 1709 Jackson St., Omaha 2, Neb. Bids Jan. 23, awarded Mar. 23. CD 2/1 under LB.

Gustav Hirsch Organization, Inc., 1347 W. 5 Ave., Columbus, O., CA $512,272, new East Lincoln Sub-station,

Grace
ASPHALT AND COMPACTION EQUIPMENT

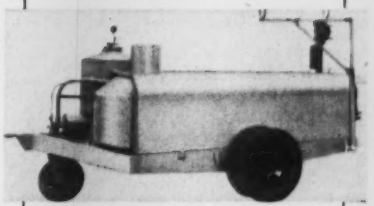


Roadsweepers, traction, engine-driven or tractor-mounted

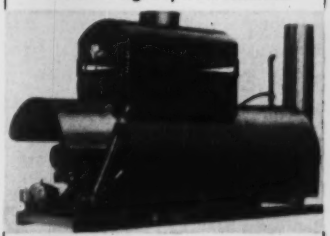


Sheepsfoot rollers

Chip spreaders



Circulating asphalt heaters



Automatic oil heaters for hot plants

Pneumatic rollers, self-propelled or trailed

W. E. GRACE MFG. CO.
6015 S. LAMAR, DALLAS, TEXAS

NEBRASKA. Nebraska Public Power Sys., 2416 14 St., Columbus, Neb. P. E. Hampton, c/o owner, ch. engr. CD 10/6.

† **Peter Kiewit Sons' Co.**, 2926 N.W. 39 St., Oklahoma City, Okla., CA $678,598, Item No. 4, roads, streets and parking areas, Clinton-Sherman Air Force Base, Cont. NBy-1094, Spec. 1094/56, CLINTON, OKLA. Officer in Charge of Constr., 8th Naval Dist., Bldg. 16, U. S. Naval Station, New Orleans (Algiers), La. Bids Mar. 28. CD 4/5, under LB.

† **V & N Constr. Co.**, 202 37th St., Lubbock, Tex., CA $942,606. 3 story, 200-man capacity dormitory, 800-capacity dining hall, Reese Air Force Base, Inv. ENG-29-005-56-55, LUBBOCK, TEX. U. S. Eng., Box 1538, Albuquerque, N. M. Bids Mar. 15. CD 2/8.

† **Allen M. Campbell Co.**, Box 936, Tyler, Tex. LB $653,137. equipment and storage bldgs., Holloman Air Force Base. ENG-29-005-56-62, ALAMOGORDO, N. M. U. S. Eng., Box 1538, Albuquerque, N. M. Bids Mar. 30. CD 3/21.

▲† **R. E. McKee General Contractor, Inc.**, 1918 Texas St., El Paso, Tex. CA $1,212,730. missile assembly bldg., Holloman Air Force Base, ENG-29-005-56-67, ALAMOGORDO, N. M. U. S. Eng., Box 1538, Albuquerque, N. M. CD 4/10, under LB.

BUILDINGS—LB & CA

▲ **Ken Borschel & Son**, 1100 35th St. N. E., Cedar Rapids, Iowa, Owner Builds. $1,700,000. HOUSING, CEDAR RAPIDS, IOWA.

▲ **Del E. Webb Constr. Co., and H. M. Becker & Assocs.**, S. 23 Ave., Phoenix, Ariz. Owner Builds. $6,000,000. 500-unit HOUSING DEVELOPMENT, Johnson Ave. and E. Ave. N. W., CEDAR RAPIDS, IOWA.

Schuermann Building Co., 5934 Natural Bridge Ave., St. Louis 14, Mo. Owner Builds. $960,000. eighty 1 story DWELLINGS in Northland Hills Subdivision No. 2 on Clarion, Dover, Ellison, Glade, Meadow Lark and Solway Aves., ST. LOUIS COUNTY, MO.

▲ **M. W. Kellogg Co.**, 225 Broadway, New York, N. Y. CA Est., $3,000,000. catalytic REFORMER and auxiliary facility to produce 11,000 bbls. per day at refinery, PONCA CITY, OKLA. Continental Oil Co., Ponca City, Okla. CD 1/4/52.

▲ **Western Precipitation Corp.**, 1000 W. 9 St., Los Angeles, Calif., CA $415,000, alterations and constr. facilities for removal of dust and fumes; CA $990,000, rein.-con. fdns., BUILDINGS and structures, flues, water, sewer lines and electrical connections, DALLAS, TEX. Lone Star Cement Corp., 1st. Natl. Bank Bldg., Dallas, Tex. CD 4/5.

A. **P. Kasch & Sons**, Box 1472, Big Spring, Tex. LB $874,222. est. $900,000. units of HIGH SCHOOL, auditorium, gymnasium and bus shop, group classrooms, SEMINOLE, TEX. Seminole Common Consolidated School Dist., Seminole, Tex. Bids Apr. 3. CD 3/1.

State of Wyoming, State Capitol, Cheyenne, Wyo., rejected bids Apr. 2, 2 story, 20,000 sq. ft. 70-bed INFIRMARY; 1 story, 13,000 sq. ft. brick THERAPY BLDG. EVANSTON, WYO. LB $638,100. CD 3/16.

Clyde O. Hoyt, Jr., 1002 E. Rio Grande, Colorado Springs, Colo. CA $500,000. altering Antlers HOTEL, COLORADO SPRINGS, COLO. Fairmont Hotel Co., Fairmont Hotel, California and Mason Sts., San Francisco, Calif. Albert Parvin & Co., 120 N. Robertson St., Los Angeles, Calif., engrs.-archts. Awarded Apr. 2.

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES
April 27 Oregon

STREETS AND ROADS
April 27 Oregon May 2, 3 California

▲† **California**—BA 5/1—U. S. Eng., 751 S. Figueroa St., Los Angeles, Los Angeles River Imprvt. Florence Ave. to Stewart and Gray Rd., Downey, Los Angeles Co., $2,000,000. CD 4/21/44.

▲† **California**—BA 5/3—U. S. Eng., 751 S. Figueroa St., Los Angeles, channel imprvs., Westwood and Sawtelle Channels, Westwood Branch National Blvd. to Charnock Rd., CIVENG-04-353-56-49. $1,000,000. CD 10/13.

† **California**—BA 5/8—U. S. Eng., 751 S. Figueroa St., Los Angeles, levee from existing levee to Crestmore Ave. Bridge, Santa Ana River Basin, Riverside, CIVENG-04-353-56-57. $500,000. CD 4/21/44.

HEAVY CONSTRUCTION—LB & CA

▲ **WASHINGTON**—State Hy. Comm., Olympia, Wash.—**Peter Kiewit Sons Co.**, Box 531, Vancouver, Wash., LB $522,731 (3 bidders) light bit. surf., c. conc. paving and Type T-1 b. conc. 3.523 mi. Primary St. Hy. 3, Dry Creek to Steptoe, FAP No. F-037-2 (3), Whitman Co.;

Wash.—**C. E. Oneal**, Box 270, Ellensburg, Wash., LB $542,066 (10 bidders) clearing, drainage, grading 2.373 mi. Primary St. Hy. 2, Dryden to Cashmere. FAP No. F-029-1 (10), Chelan Co.;

Wash.—**McAtee & Heathe, Inc.**, Box 4187, Station B, Spokane, Wash. and **F. R. Hewett**, Box 36, Parkwater Station, Spokane, Wash., LB $705,019 (4 bidders) surf., constr. cement treated base, Type I-1 b. conc. paving, install lighting sys. 5.109 mi. Primary St. Hy. 2, Pines Rd. to Custer St. FAP No. IN-002-6 (15), Spokane Co.;

Wash.—**United Paving Co.**, Rte 1, Box 188, Spokane, Wash., LB $80,890 (2 bidders) light bit. surf. and Type I-1 b. conc. paving 2.84 mi. Primary St. Hy. 11, Tyler northeasterly, Spokane Co.;

Wash.—**C. E. Oneal**, Box 270, Ellensburg, Wash. and **Riverside Sand & Gravel Co.**, Box 301, Yakima, Wash. LB $232,488 (2 bidders) surf., road mix bit. surf. 6.708 mi. Secondary St. Hy. 3-A, Satus to Mabton, FAS No. S-0268 (8), Yakima Co.;

Wash.—**Northwest Asphalt Co.**, 7343 E. Marginal Way, Seattle, Wash., LB $142,366 (4 bidders) surf., paving with Type I-1 b. conc. and unfinished c. conc. 0.75 mi. Secondary St. Hy. 1-K.W. Marginal Way to Cloverdale St. approach to 1 Ave. S. Bridge, King Co.;

Wash.—**Erland & Blickle**, Box 1945, Portland, Ore. LB $135,945, surf., constr. cement treated base and Type I-1 b. conc. paving 2.113 mi. Primary St. Hy. 12, Nichols Blvd. in Longview, et al, Cowlitz Co. Bids Apr. 3. CD 3/21.

▲ **Morrison-Knudsen Co. Inc.**, 319 Broadway, Boise, Idaho and **Valley Constr. Co.**, 7708 Rainier Ave., Seattle, Wash., CA $490,000, install 25 mi. 20- to 41½-in. welded steel pipe, coated and wrapped for supply lines from point near Renton to Georgetown pumping station and from point near Issaquah to serve communities east of Lake Washington, WASHINGTON. Washington Natural Gas Co., Gasco Bldg., Seattle, 1, Wash. Grand total $1,774,300. Bids Apr. 2. CD 3/28;

Thorne & Marble Co., Inc., 4225 23 Ave. W., Seattle, Wash., CA $442,300, install 26 mi. 20- to 41½-in. welded steel pipe, coated and wrapped for supply lines from point near Alderwood Manor to North Seattle and Everett Sys. (Washington);

Hood Constr. Co., 3002 E. Century Blvd., Glenwood, Calif., CA $42,000, install 19 mi. 20- to 41½-in. welded steel pipe line, coated and wrapped for supply line from point near Dieringer to Tacoma (Washington).

▲ **Kuckenberg Constr. Co.**, 11104 N.E. Holman St., Portland, Ore., LB $4,789,981, est. $4,767,352 (7 bidders) east side approaches to Morrison and Hawthorne Bridges, PORTLAND, ORE. Multnomah Co., Court House, Portland, Ore. Bids Apr. 10. CD 3/30.

▲ **CALIFORNIA**—State Div. Hys., 1120 N. St., Sacramento,

Fredericksen & Kasler, 212 13 St., Sacramento, Calif., LB $2,285,809 (6 bidders) 4-lane divided hy. on U.S. 99 and Sign Rte. 152 between Calif. and Merced Co. line 7 mi., 7 bridges, Madera Co. Bids Mar. 28. CD 3/5.

† **H. Earl Parker**, 12 and F Sts., Marysville, Calif., CA $838,470, normal bank protection at 4 locations along Sacramento River, Sutter and Yolo Counties, CIVENG-04-167-56-34, CALIFORNIA. U. S. Eng., 1208 8 St., Sacramento, Calif. Bids Mar. 21, awarded Apr. 3. CD 3/28, under LB.

† **Pinole Land Co., Inc.**, 1600 Belmont St., Fresno, Calif. CA $528,500. clearing channel at Feather River and Sutter bypass to Yuba River, ENG-56-84, Spec. 1895A, CALIFORNIA. U. S. Eng., 1209 8 St., Sacramento, Calif. Bids Mar. 27, awarded Apr. 2. CD 4/2, under LB.

▲† **Hydraulic Dredging Co.**, First Western Bank Bldg., Oakland, Calif. CA $2,237,780. dredging Sacramento Deep Water Channel, CALIFORNIA. U. S. Eng., 1209 8 St., Sacramento, Calif. Bids Mar. 20. CD 3/23, under LB.

Webb & White, 7220½ Melrose Ave., Los Angeles, Calif. LB $897,000. (2 bidders) site clearance and excav. for Hall of Administration, LOS ANGELES, CALIF. Bd. Retirement of the Retirement Assoc. of Los Angeles County, 108 W. 2 St., Los Angeles, Calif. Bids Apr. 4. CD 3/19.

BUILDINGS—LB & CA

Quality Development Co., 1124 S. Beverly Dr., Los Angeles, Calif. Owner Builds. $831,600. 84 frame, stucco DWELLINGS, Woodbay Dr., Lanfield Dr., BELLFLOWER, CALIF.

Shopping Bag Properties, Inc., 2716 San Fernando Rd., Los Angeles, Calif. Owner Builds. $470,000. 145,160 sq. ft. WAREHOUSE, 10150 Lower Azusa Rd., EL MONTE, CALIF. H. W. Underhill, 4313 Leimert St., Los Angeles, Calif., archt.

Moss Bldg. Corp., 227 S. Robertson St., Beverly Hills, Calif. CA $545,700. 48 frame, stucco DWELLINGS, W. Ave. H-7, Valiant St., LANCASTER, CALIF. Vista Park, 227 S. Robertson St., Beverly Hills, Calif. Curtis Chambers, 28 S. Fair Oaks, Pasadena, Calif., archt.

† **E. H. Moore & Sons**, 693 Mission St., San Francisco, Calif. CA $508,851. Army Family HOUSING, DISCIPLINARY BARRACKS, ENG-04-353-56-89, LOMPOC, CALIF. U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif. Bids Mar. 13, awarded Mar. 30. CD 3/26, under LB.

▲ **J. A. McNeil Co., Inc.**, 3115 W. Mission Rd., Alhambra, Calif., CA $7,000,000. general contract. 13 story FURNITURE MART, Washington and Broadway Sts., LOS ANGELES, CALIF. Furniture Mart, 2177 W. 7th St., Los Angeles, Calif.

▲ **Stoneson Development Corp.**, 3150 20 Ave., San Francisco, Calif. Owner Builds. $1,376,000. 2nd unit, 86-HOME subdivision in Millbrae Meadows Tract, MILLBRAE, CALIF. CD 7/29/54.

B & R Constr. Co., 110 Market St., San Francisco, Calif. CA $931,218. 48,000 sq. ft., brick Novato HIGH SCHOOL, NOVATO, CALIF. Novato Union Elementary School Dist., 625 Grant Ave., Novato, Calif. CD 3/21, under LB.

McIlroy Constr. Co., 1835 Alum Rock Ave., San Jose, Calif., CA $566,942. Calaveras Road HIGH SCHOOL, SAN JOSE, CALIF. Eastside Union High School Dist., North White Rd., San Jose, Calif. Bids Mar. 27. CD 4/6, under LB.

Maino Constr. Co., 2238 S. Broad St., San Luis Obispo, Calif. LB $564,830. (3 bidders) general constr. 1-story, E-shaped ENGINEERING BLDG., California State Polytechnic College, SAN LUIS OBISPO, CALIF. State Div. Architecture, 1100 S. Grand Ave., Los Angeles, Calif. Bids Apr. 4. CD 3/6.

CANADA

HEAVY CONSTRUCTION—LB & CA

NORTH WEST TERRITORIES—Dpt. P. Wks., Hunter Bldg., Ottawa, Ont.

Western Constr. & Lumber Co. Ltd., 11111 105th Ave., Edmonton, Alta., CA $900,000. constr. 40 mi. gravel surfaced road, 22 ft. shoulder-to-shoulder, Mills Lake. Bids Feb. 29, awarded Mar. 20. CD 3/7, under LB.

BUILDINGS—LB & CA

Ellis-Dore, 109 8th Ave. E., Calgary, Alta., CA $840,560. warrant officers and sergeant's QUARTERS, MESS BLDGS., sewage pumping house, heater house, etc. Camp Sarcee, CALGARY, ALTA. Defence Constr. Ltd., 56 Lyon St., Ottawa, Ont. Bids Mar. 22. CD 3/7.

Foundation Co. of Canada, Ltd., 1302 11th Ave. W., Calgary, Alta., CA $600,000. WAREHOUSE and DISTRICT OFFICE, 120 St. and 109A Ave., EDMONTON, ALTA. International Harvester Co. of Canada, 200 Hillyard Ave., Hamilton, Ont., Kyles & Kyles, 247 John St. S., Hamilton, Ont., archts. CD 9/22/50.

Smith Bros. & Wilson, Ltd., 1267 Richards St., Vancouver, B. C., CA Est. $730,882, SERGEANTS' QUARTERS, TECHNICAL STORES BLDG., JUNIOR RANKS CLUB, outside services, CHILLIWACK, B. C. Defence Constr. Ltd., 56 Lyon St., Ottawa, Ont. Bids Mar. 29. CD /14.

Fraser Brace Eng. Co. Ltd., 60 St. James St. W., Montreal, Que., CA Approx. $500,000. carbon bisulphide PLANT, 2nd Ave. W., CORNWALL, ONT. Cornwall Chemical Ltd., 1235 McGill College Ave., Montreal, Que. CD 11/21.

▲ **Lunar Co. Ltd.**, 880 Queen St. W., Toronto, Ont. CA Est. $1,000,000. 7 story, 6,300 sq. ft. OFFICE, 181-5 Bay St., TORONTO, ONT. Samuel Zack-Concord Realty, Ltd., c/o Lipson & Dashkin, archts., 33 Bloor St. E., Toronto, Ont. Awarded Apr. 4. CD 3/21.

▲ **Hughes Constr. Co. Ltd.**, 365 Rogers Rd., Toronto, Ont., LB $2,869,400 (5 bidders) 2 story, part bsmnt. approx. 170x180 ft., 1 story, 240x308 ft. annex WOMENS' BLDG. at Canadian National Exhibition, TORONTO, ONT. City, City Hall, Toronto, Ont. Bids Mar. 26. CD 3/7.

▲ **Wilfred Legare, Inc.**, 395 St. Foy St., Quebec City, Que., CA $1,025,000. substructure for 1 story, 200x450 ft., rein.-con. fdn. and frame CUSTOMS and IMMIGRATION BLDG., Wolfe's Cove, QUEBEC CITY, QUE. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Jan. 18, awarded Mar. 20. CD 1/25, under LB.

ALASKA

HEAVY CONSTRUCTION—LB & CA

† **W. A. Smith Contg. Co.**, Spenard, Alaska, LB $521,890, est. $622,550 (5 bidders) re-spacing ties on 21,600 ft. track, raising and dressing 44,300 ft. track, placing 19,000 ties, laying 44,300 ft. 70-and 115-lb rail, etc., SEWARD, ALASKA. The Alaska R.R., Dpt. Interior, Anchorage, Alaska, Bids Apr. 5.

AMERICANS ABROAD

HEAVY CONSTRUCTION—LB & CA

† **Hydrocivil**, Madrid, Spain, CA $569,342, constr. Group B facilities (Spanish Air Base Program) ROTA, SPAIN. Bureau Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C. U. S. A. Bids Feb. 29. CD /12, under LB.

† **Entrecanales**, Madrid, Spain, CA $670,000. Group D facilities (Spanish Air Base Program), TORREJON, SPAIN. Bureau Yards & Docks, Navy Dpt., 18 and Constitution Ave. N.W., Wash. 25, D. C., U. S. A. Bids Mar 7. CD 3/21, under LB.

▲† **Samford-Markowitz, Inc.**, 5600 N.E. 4 Ave., Miami, Fla., U. S. A., CA $7,951,641, POL pumping station, various locations (Spanish Air Base Program), SPAIN. Bureau Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., U. S. A., Bids Mar. 28. CD 4/4, under LB.

FOREIGN

HEAVY CONSTRUCTION—LB & CA

▲ **India**—Government of India, Delhi, awarded contract for steel plant at Durgapur, India to Indian Steelworks Constr. Co. (a combination of British companies). Total cost $224,000,000. Included in the combination:
Simon-Carves, Ltd. coke ovens, $42,000,000;
Head, Wrightson & Co., blast furnaces, $30,800,000;
Wellman Smith Owen Engineering Corp., melting shop, $25,200,000-$30,800,000;
Joseph Parks & Son and Dorman Long Bridge & Engineering Co., Sir William Arrol & Co. Ltd., and **Cleveland Bridge & Engineering Co.**, structural steel;
Davy & United Engineering Co., rolling mills;
British Thomson-Houston Co., English Electric Co., Metropolitan-Vickers Electric Co., General Electric Co., electrical equipment. Cementation Co. Ltd., consult. engrs.

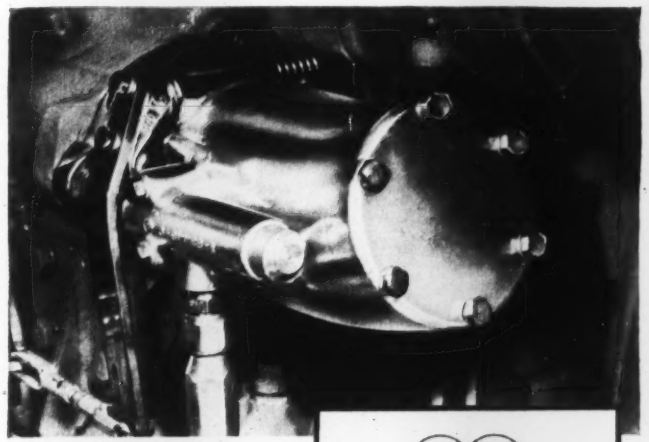
(Proposal Advertisments see p. 160 to 162)

It takes a forest giant

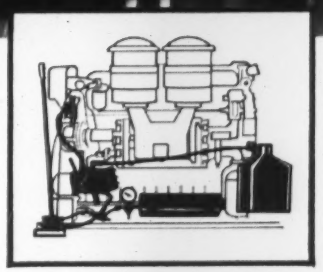
10 seconds to fall

But a Hydrostarter starts a GM Detroit Diesel in

Only a split-second



Heart of the Hydrostarter is this hydraulic starting motor. Other components are an engine-driven pump, accumulator, emergency hand pump and reservoir.



15/100 of a second is a mighty short time—but that's all the time needed by a Hydrostarter to start a General Motors Detroit Diesel. And a Hydrostarter costs less to maintain than regular starting systems, costs less to buy than any other nonelectric diesel starter. What's more, a Hydrostarter can last a lifetime—as proved by a record 26,788 starts in a recent 26-day test. For fast, sure starts even at 20° below, order a Hydrostarter on your next GM Detroit Diesel —or have one installed on your present engine. See your GM Detroit Diesel distributor or dealer for more information or write direct.

DETROIT DIESEL

Engine Division of General Motors • Detroit 28, Michigan

Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 893 H.P.

AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

RUBBING CEILINGS?

Do it GIRAFFE with a CEILING GRINDER

- **FASTER AND EASIER:** One man will average almost 4000 sq. ft. per day. Does not need scaffolding.
- **CHEAPER AND BETTER:** Money saved on finishing will help pay for grinding.
- **DEPENDABLE:** Individual GIRAFFES have worked more than 1,000,000 square feet without major overhaul.

GIRAFFE ®

Heights up to 24 ft.

Has been adapted to cleaning ceilings.

CONCRETE GRINDING CORP.
300 STRAIGHT ST. PATERSON, N. J.

Arizona Air Base Requires Precision Work

Design plans for a taxiway, runway and aprons extension at Davis-Monthan Air Force Base in Tucson, Arizona, must be followed with utmost accuracy. The contract requires such close tolerances that permanent bench marks are to be installed at frequent intervals along the runway to control grades.

Work includes 240,000 sq yds of portland cement concrete paving and 13,000 tons of bituminous paving plus drainage, tie-down anchors, aircraft fuel lines, airfield painting and marking, and the dismantling and demolition of structures and utilities.

M. M. Sundt Construction Co. of Tucson got the $2,649,957 contract awarded by the Los Angeles District of the Corps of Engineers. His low bid was 1.4% below the second bid and 7.7% below the engineer's estimate.

The government furnishes 91 transformers, 200 w and 6.6 amp, and miscellaneous fittings for the runway lighting to be installed by the contractor.

Class A concrete for structures has to test at a minimum of 3,000 lbs after 28 days, and class B concrete for pipe encasements, ducts, light bases and over-run area must stand a minimum pressure of 2,500 lbs after the same period. ASTM standards A 21.2, A 21.6 or A 21.8 Class 150 apply to cast iron pipe.

Minimum wages range from $2.10 to $2.85 for common laborers, $2.325 to $3.05 for equipment operators, and $2.85 to $3.10 for iron workers.

Field work started in February 1956 and has to be completed within 400 calendar days by April 1957. There are no liquidated damages fixed.

The bidders include:

1C	M. M. Sundt Construction Co., Tucson, Ariz	$2,649,957
2	Fredericksen & Kasler, Sacramento, Calif.	2,687,618
4	R. A. Westbrook, Inc. & Morrison-Knudsen Co., Inc., Los Angeles, Calif	2,758,212
EE	Corps of Engineers, Los Angeles, Calif	2,869,614

Bids: 1-27-56 Items	Unit	Quantity	Unit Prices 1C	2
Taxiway				
Duct, direct burial, 3", 1	lf	5,835	$1.11	$1.00
RC, encased, 4", 1	lf	4,283	2.23	2.00
4", 4	lf	310	5.35	4.80
3", 2	lf	150	4.00	3.60
Gas pipe, 1"	lf	310	1.67	2.60
Raise to grade exist cable & switch box	ea	10	56.00	50.00
exist water valv box	ea	1	28.00	450.00
Fire report tel station	ea	18	145.00	130.00
Fire hydrant, remov & reloc	ea	10	56.00	90.00
f & i	ea	4	253.00	300.00
Water pipe, CI, 6"	lf	895	3.82	4.50
8", mech joint	lf	160	6.52	10.00
Tapp sleev & valv, 6"	ea	2	266.00	310.00
8", & valv, 6"	ea	2	217.00	350.00
Excavation	cy	30,000	2.10	0.61

BIDS: 1-27-56 Items	Unit	Quantity	Unit Prices 1C	2
Borrow	cy	106,800	0.84	0.95
RCP, extr strength, 24"	lf	114	15.70	14.40
30"	lf	350	18.60	15.10
36"	lf	230	21.00	17.50
78"	lf	1,060	68.00	62.00
102"	lf	1,177	104.00	94.00
Addition to exist conc headwall	ls	job	9,500	7,400
Catch basin, construct	ea	6	702.00	920.00
remov & construct	ea	2	1,337	1,000
remov	ea	2	111.00	100.00
Cover, conc, on catch basin	ea	6	324.00	350.00
Raise to grade drain junction MH No. 1	ls	job	950.00	650.00
No. 2	ls	job	360.00	200.00
No. 3	ls	job	490.00	500.00
No. 4	ls	job	700.00	850.00
No. 5	ls	job	560.00	750.00
No. 6	ls	job	1,000	1,500
Sewer MH, remov & catch basin, construct	ls	job	1,337	1,050
PCC encase exist sewer line	lf	200	7.25	5.50
Bulkhead exist pipe	ea	3	84.00	100.00
CMP, 36", remov	lf	135	3.30	5.00
RCP, 30", remov	lf	90	8.90	4.00
36"	lf	160	5.60	5.00
Water pipe, cmt asb, 8", remov	lf	160	1.11	2.00
Pave, PCC, 16"	cy	88,568	7.97	8.70
Portland cmt for conc pave	bbl	132,852	3.76	3.95
Base crse matl, select	cy	4,314	2.50	1.80
agg, stabilzd	cy	3,561	3.79	4.70
Prime coat	t	69	48.00	50.00
Tack coat	t	15	89.00	56.00
Bit binder crse	t	1,775	4.80	9.50
Bit surf crse	t	4,768	4.80	9.50
Asph cmt for binder & surf crse	t	415	37.00	9.50
Tie-down anchor	ea	1,425	7.00	6.00
Paint & stripe	ls	job	1,350	750.00
Hydrant pit, raise to grade	ea	10	500.00	200.00
Fuel line, 6"	lf	4,450	4.60	5.30
Cap, brass, over fuel line	ea	26	5.60	3.50
Aluminum disk	ea	23	11.00	3.50
Seed	ac	8	134.00	320.00
Asph conc stockpls, remov	cy	6,900	0.89	1.50
Marker lights, remov & salv	ls	job	550.00	1,100
RCP, extr strength, 27"	lf	135	21.00	16.20
108"	lf	2,130	116.00	90.00
Drain junction box, const	ls	job	2,800	3,800
Catch basin, const	ls	job	3,550	4,500
Bulkhd pipe, 48" & stub into pipe, 108"	ls	job	560.00	260.00
MH, elec & tel, raise to grade	ls	job	780.00	1,400
RCP, 38", remov	lf	48	11.00	7.00
MH, fueling, remov	ls	job	167.00	150.00
Subtotal:	1C	$2,001,188	2	$2,006,293
Runway				
Night light substa & primary & service ext	ls	job	6,700	6,000
Duct, direct burial, 3", 1	lf	8,570	1.11	1.00
3", 3	lf	170	2.00	1.80
3", 4	lf	6,860	2.56	2.30
RC encased, 4", 2	lf	200	4.20	3.75
4", 4	lf	1,410	5.35	4.80
Light base, method C	ea	44	33.50	30.00
method D	ea	89	156.00	140.00
Approach cross bar, 10 light base	ea	2	1,100	1,000
center bar, 5 light base	ea	6	560.00	500.00
Handhole, elec	ea	9	853.00	765.00
Light base, extend	ea	20	145.00	130.00
Marker light, type C-1 & transformer	ea	29	5.60	5.00
type M-1 & transformer	ea	49	5.60	5.00
semi-flush & transf	ea	12	7.80	7.00
Overrun light & transf	ea	94	5.60	5.00
Duct marker, conc	ea	4	11.00	10.00
Trench & bkfl for direct burial cable	lf	5,500	0.28	0.25
Cable assemb, lead, plug or receptcl, 5,000V, 3'	ea	45	1.11	1.00
10'	ea	92	1.11	1.00
20'	ea	99	1.67	1.50
50'	ea	29	1.95	1.75
103'	ea	87	2.23	2.00
205'	ea	37	2.80	2.50
600'	ea	5	3.35	3.00
Cable, 5,000V, 1 C #8	lf	60,000	0.07	0.06

Continued on following page

When the special requirements of the huge, $14 million Army Finance Center emerged from planning, reinforced concrete was selected by the Corps of Engineers, U. S. Army, as the best method of structural framing.

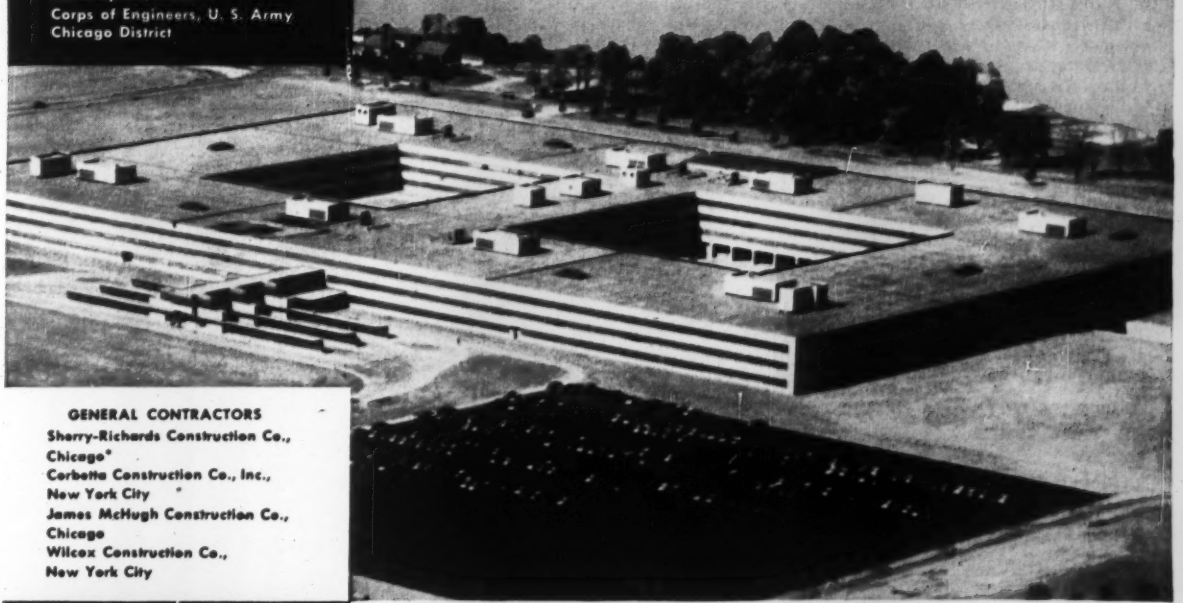
Reinforced concrete was found to be more economical than other structural materials . . . erection progress more rapid . . . maintenance costs were estimated to be less . . . and it proved to be the most adaptable medium for such a low, spread-out structure.

Reinforced concrete is the ideal material for structures of practically all types and shapes. It provides rugged strength that is highly resistant to wind, shock, and quakes, and is firesafe without extra treatment. Furthermore, it permits great flexibility of design, and materials and labor are readily available from local areas. On your next job, it may well pay you to *design for reinforced concrete.*

"REINFORCED CONCRETE is more economical... faster to erect... less costly to maintain"

ARMY FINANCE CENTER

Army Finance Center, U. S. Army
Indianapolis, Indiana
Corps of Engineers, U. S. Army
Chicago District



GENERAL CONTRACTORS
Sherry-Richards Construction Co., Chicago*
Corbetta Construction Co., Inc., New York City
James McHugh Construction Co., Chicago
Wilcox Construction Co., New York City

*Construction and supervision by Sherry-Richards, sponsor of joint venture.

Compare...

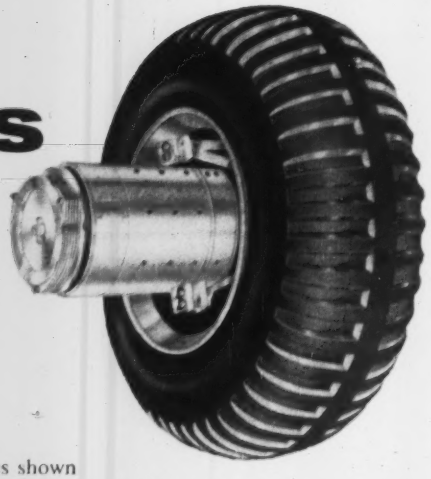
YOU'LL SAVE WITH REINFORCED CONCRETE

38 South Dearborn Street • Chicago 3, Illinois

CONCRETE REINFORCING STEEL INSTITUTE

BIG WHEELS

and... little switches



Consider the LeTourneau machines shown here. In each case a team of *big electric wheels* does the instant bidding of *little electric switches* . . . a single operator in the cab of any one of these giants moves a simple control and the machine instantly responds.

Each of the big wheels drives, brakes, and can be steered — for each is a LeTourneau Electric Wheel, a new type of power package consisting of a LeTourneau Electric Motor and Gear Reduction within the rim of the wheel. These wheels float on huge, extra-wide base tires, which provide ground contact area up to 4 feet wide at each wheel for greater traction and flotation than ever before obtainable, making operation possible in deep mud, powdery snow, or loose beach sand.

All functional operations of this new LeTourneau equipment are powered by LeTourneau Electric Gearmotors, and controlled by the machine's single operator with simple electric controls.

This principle of electric power and control is a great new development which has increased mobility for the military and increased production speeds for industry. It is a principle which LeTourneau can put to work for you immediately. May we be of help? Phone, wire or write today.

LeTOURNEAU SNO-BUGGY. Built for exploration of polar areas, including dry, powdery snow. Has huge dual tires on each electric wheel for maximum flotation and traction.

LeTOURNEAU SNO-FREIGHTER. 24 electric wheels of this six-section vehicle drive and brake to carry large tonnages of cargo into arctic wastelands.

LeTOURNEAU AIRTOW. Quickly swings and spots big planes using infinite power selection for smooth, powerful starts by four electric wheels that drive, steer, and brake.

LeTOURNEAU CORPORAL LOADER for ground handling the Corporal Guided Missile. This electric wheel vehicle picks up, transports, and erects the missile in the launcher.

Manufacturers of BIG Equipment Since 1929

R. G. LeTOURNEAU INC

2724 So. MacArthur, Longview, Texas G103

. . . Unit Prices

Bids: 1-27-56 Items	Unit	Quantity	Unit Prices 1C	2
Counterpoise wire; bare copper, #4AWG	lf	9,500	0.22	0.20
Regultrs & contrls in exist vault	ls	job	475.00	425.00
Equip & supprts in vault, i	ls	job	1,900	1,700
Threshold & overrun lights, transfr & light bases, remov	ls	job	1,340	1,200
Marker lights & base, remov	ls	job	560.00	1,100
Excavation	cy	59,000	0.91	0.61
CMP, 36", remov	lf	360	3.35	2.70
RCP, extra strength, 39"	lf	1,280	22.00	19.50
42"	lf	428	24.50	22.50
Addition to exist conc headwall	ls	job	1,300	1,300
Headwall, conc	lf	job	950.00	1,200
Catch basin, heavy duty	ea	3	702.00	920.00
Pave, PCC, 16" & 18"	cy	13,910	8.15	9.00
Subbase crse matl, select	cy	10,470	2.40	1.80
Subgrade, prepare, 24"	sy	26,922	0.56	0.21
Base crse, agg, stabilzd	cy	4,490	3.45	5.70
Prime coat	t	54	48.00	50.00
Tack coat	t	28	89.00	56.00
Bit binder crse	t	3,625	4.80	9.50
surf crse	t	2,221	4.80	9.50
Asph cmt for binder & surf crse	t	383	37.00	9.50
Paint & stripe	ls	job	12,000	16,000
Distance markers, remov old & instal new	ls	job	1,100	300.00
Seed	ac	33	134.00	320.00
Borrow	cy	44,000	0.89	0.95
Subtotal:	**1C**	**$536,556**	**2**	**$545,764**
Aircraft Blast Pad				
RCP, extra strength, 42"	lf	426	24.50	22.50
Catch basin, heavy duty	ea	1	702.00	920.00
Base crse matl, select	cy	568	2.40	4.00
Prime coat	t	7	48.00	58.00
Bit surf crse	t	367	4.80	12.00
Asph cmt for surf crse	t	24	37.00	12.00
Paint & stripe	ls	job	120.00	150.00
Subtotal:	**1C**	**$15,608**	**2**	**$18,023**
Parking Apron				
Excavation	cy	8,700	0.91	0.70
Pave, PCC, 16"	cy	6,115	8.15	11.00
Portland cmt for pave	bbl	9,172	3.76	3.95
Base crse matl, select	cy	527	2.40	4.00
Prime coat	t	5	48.00	58.00
Bit surf crse	t	298	4.80	12.00
Asph cmt for surf crse	t	19	37.00	12.00
Paint & stripe	ls	job	56.00	150.00
Seed	ac	5	134.00	320.00
Subtotal:	**1C**	**$96,605**	**2**	**$117,530**

Bulkhead in Lake Michigan

To enclose submerged lands, the Milwaukee, Wis., Harbor Commission will build a bulkhead of 1,860 lin ft of steel sheet piles. The site is located north of Milwaukee Harbor.

Piles are MZ 32 steel and 50 ft long. Dredging and backfilling has to be done over two rows of timber anchorage.

The $676,000 contract went to Edward E. Gillen Company of Milwaukee. Their low bid topped the engineer's estimate by 3.9% but was 9% under the second low bid.

R. G. Krahn is engineer for the Board of Harbor Commission.

Wages range from $2.225 for common labor to $3.065 for skilled labor.

Bidders include:

1C Edward E. Gillen Company, Milwaukee, Wis.	$676,000
2	742,829
EE R. G. Krahn, Board of Harbor Commission, Milwaukee, Wis.	650,000

Bids: 2-29-56 Items	Unit	Quantity	Unit Prices 1 C	2
Stl sheet pile bkhd & anchorage, construct	lf	1,859	$308.77	$340.14
Dredge & bkfl behind bkhd	cy	85,000	1.20	1.30

Champs with a new power punch!

These Task-Force heavyweights pack the biggest power punch in Chevrolet truck history with a completely new Loadmaster V8 and revolutionary new Powermatic Drive!

Modern short-stroke V8's are standard in *all* new Task-Force L.C.F.'s and heavyweight haulers — with the big new 322-cu.-in. Loadmaster in top-tonnage L.C.F.'s and in other models rated up to 32,000 lbs. G.V.W. and 50,000 lbs. G.C.W.! It's Chevrolet's Taskmaster V8 in other heavy-duty models!

Get new Powermatic Drive, a 6-speed automatic specially built for heavy-duty jobs, for the most flexible and efficient application of engine power! Optional at extra cost in all conventional heavy- and most medium-duty trucks. See your Chevrolet dealer for details on the right model for your job! ... Chevrolet Division of General Motors, Detroit 2, Michigan.

CHEVROLET **NEW CHEVROLET TASK·FORCE TRUCKS**

Anything less is an old-fashioned truck!

Materials and Labor Prices

Monthly Market Quotations by ENR Field Reporters

See following ENR issues for OTHER PRICES: • Apr 26—Clay Products, Lime, Plaster, Paint, Roofing • May 3—Wage Rates, Building Board, Lath, Insulation • May—Cement, Aggregates, Ready-mixed Concrete, Asphalt

LUMBER, TIMBER, PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

SOUTHERN PINE AND DOUGLAS FIR

All Southern Pine is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)

All Fir boards, dimensions, planks No. 2, Fir small timbers and timbers are No. 1. Lengths up to 20 ft. (Prices in italics)

		1x6 #4s	1x8 #4s	2x4 #4s	2x6 #4s	2x8 #4s	2x10 #4s	3x12 Rgh	6x12 Rgh	12x12 Rgh
Atlanta	†	**$83.00**	**$85.00**	**$77.50**	**$76.00**	**$79.50**	**$83.00**	**$81.00**	.....	.....
Baltimore	*	**93.00**	**96.00**	**98.00**	**100.00**	**100.00**	**104.00**	**114.00**	.....	.....
		110.00g	*110.00g*	*128.00g*	*128.00g*	*128.00g*	*128.00g*	*138.00g*	*$144.00*	*$144.00*
Birmingham	†	**86.00**	**88.00**	**81.00**	**88.00**	**91.00**	**96.00**	**111.00**	.....	.....
		111.50	*111.50*	*114.50*	*115.00*	*115.00*	*116.50*	*114.50*	*111.50*	*111.50*
Boston	*	**110.00a**	**113.00a**	**115.00a**	**115.00a**	**115.00a**	**113.00a**	.....	.....	.....
		99.00n	*99.00n*	*133.00*	*133.00*	*133.00*	*134.00*	*139.00*	*136.00*	*146.00*
Chicago	**	**104.00**	**107.00**	**100.00**	**115.00**	**123.00**	**124.00**	**119.00**	.....	.....
		113.00	*113.00*	*136.00*	*134.00*	*134.00*	*136.00*	*133.00*	*133.00*	*133.00*
Cincinnati	*	**101.25**	**102.50**	**90.00**	**96.25**	**103.00**	**111.50**	**119.50**	.....	.....
		104.25	*106.25*	*116.00*	*117.75*	*119.00*	*119.25*	*143.00*	*143.00*	*143.00*
Cleveland	**	**99.00**	**101.00**	**109.00**	**105.00**	**105.00**	**106.00**	.....	.....	.....
				133.00	*118.00*	*118.00*	*118.00*	*136.00*	*136.00*	*136.00*
Dallas	kǂ	**75.00**	**80.00**	**72.00**	**72.00**	**70.00**	**70.00**	**130.00**	.....	.....
Denver	*	*Not in stock*		*180.00*	*181.00*	*181.00*	*183.00*	*188.00*	*165.00*	*164.00*
Detroit	ǂ	**115.00**	**118.00**	**108.00**	**115.00**	**118.00**	**122.00**	.....	.....	.....
		126.00	*125.00*	*134.00*	*130.00*	*130.00*	*136.00*	*176.00*	*185.00*	*185.00*
Kansas City	*	**130.00**	**130.00**	**125.00**	**130.00**	**140.00**	**140.00**	.....	.....	.....
		130.00	*130.00*	*130.00*	*130.00*	*135.00*	*140.00*	*165.00*	*185.00*	*210.00*
Los Angeles	1	*110.00*	*140.00*	*110.00*	*110.00*	*110.00*	*110.00*	*128.00*	*158.00*	*128.00*
Minneapolis	#	*135.00*	*135.00*	*140.00*	*140.00*	*140.00*	*140.00*	*175.00*	*175.00*	*175.00*
Montreal	ab	**94.00**	**107.00**	**94.00**	**94.00**	**110.00**	**130.00**	.....	.....	.....
		172.00	*172.00*	*172.00*	*172.00*	*172.00*	*172.00*	*160.00*	*160.00*	*160.00*
New Orleans	†	**106.00**	**106.50**	**98.50**	**91.00**	**96.00**	**100.00**	**124.00**	.....	.....
	†	*121.50*	*121.50*	*128.50*	*131.50*	*131.50*	*131.50*	*144.00*	*146.00*	*144.00*
New York	2	**120.00**	**122.00**	**127.00**	**131.00**	**131.00**	**131.00**	**175.00**	.....	.....
				129.50	*132.00*	*132.00*	*132.00*	*170/180*	*175/185*	*175/185*
Philadelphia	ǂ		Range from $117.00 to $137.00				**117/137**	**117/137**	.....	.....
			Range from $131.00 to $165.00				*131/165*	*156/158*	*158.00*	*158.00*
Pittsburgh	†	**103.00**	**107.00**	**104.00**	**105.00**	**110.00**	**110.00**	**165.00**	.....	.....
		120.00	*122.00*	*125.00*	*158.00*	*145.00*	*155.00*	*180.00*	*190.00*	*205.00*
St. Louis	#	**126.00**	**128.00**	**132.00d**	**137.00d**	**137.00e**	**138.00e**	.....	.....	.....
				139/141	*142.00e*	*142.00e*	*143.00e*	*192.00e*	*192.00*	*187.00*
San Francisco	A	*92.00*	*92.00*	*97.00*	*97.00*	*97.00*	*97.00*	*116.00*	*129.00*	*155.00*
Seattle	†	*78.00*	*78.00*	*80.00*	*80.00*	*80.00*	*80.00*	*103.00*	*108.00*	*112.00*
Toronto	a	**106.00**	**109.00**	**104.00**	**104.00**	**106.00**	**110.00**	**120.00**	.....	.....
		116.00	*119.00*	*138.00*	*133.00*	*133.00*	*136.00*	*151.00*	*149.00*	*152.00*

		LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)	
		2x12 Rgh	12x12 Rgh	3/8"	3/4"
Atlanta	†	.....	.....	**$22.32**	**$27.24**
Baltimore	*	**$170.00**	**$185.00**	**25.92**	**31.60**
Birmingham	†	**115.00**	**160.00**	**21.78**	**26.58**
Boston	*	.....	.....	**25.92**	**31.60**
Chicago	**	**147.00**	**147.00**	**22.45**	**27.37**
Cincinnati	*	**141.75**	**141.75**	**25.00**	**30.48**
Cleveland	**	.....	.....	**25.37**	**30.93**
Dallas	kǂ	**130.00**	**130.00**	**18.72**	**22.80**
Denver	*	.....	.....	**13.92**	**16.98**
Detroit	ǂ	.....	.....	**25.00**	**30.48**
Kansas City	*	.....	.....	.....	.....
Los Angeles	1	.....	.....	**16.56**	**20.16**
Minneapolis	#	.....	.....	**16.61ab**	**20.25ab**
Montreal	ab	.....	.....	**19.89**	**24.25**
New Orleans	†	**115.00**	**115.00**	.....	.....
New York	2	**156.00**	**154.00**	**18.72**	**22.80**
		260/280	**260/280**	**25.92**	**31.60**
Philadelphia	ǂ	**214/224**	**214/224**	**25.92**	**31.60**
Pittsburgh	†	**145.00**	.....	**25.92**	**31.60**
St. Louis	#	.....	.....	**18.72**	**22.80**
San Francisco	A	.....	.....	**12.22**	**14.91a**
Seattle	†	.....	.....	.....	.....
Toronto	a	**113.00**	.....	.....	.....

† F.o.b. mill. * F.o.b. city, CL, out of yard. ** F.o.b. city, CL, direct mill shipment. ǂ Deliv. to contr. CL. 1. Retail, LCL, at yard. # Retail, LCL, deliv. 2. Deliv. truck lots. 3. asd., truckload lots, 5/6 Mfbm

LUMBER: Bold Face Type, Southern Pine. Italics, Douglas Fir. *a Spruce. *b Tax exempt. *c 5M lots. *d 8, 10, & 12 ft. lengths. *e 8 to 16 ft. lengths. *g No. 1 common. *j 8ft. lengths. *k No. 3 common. *n #3. A Inel rail rate from North west mills to San Francisco are $11.50 to $15.00 per M ft. bm. From Northern Calif. mills $9.00 by rail, $9.50 by truck. All rates for surfaced stock. For rough, add $3.00 to above figures.

PLYWOOD: Interior Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on 3/8", $179.00; on 1/4", $201.00. Exterior 3/8", $199.00, 3/4", $223.00. For other centers add rail freight increment from table on proper size. Oiling and edge sealing charges included. *a Lower rate by water shipment. *b 50,000 lb. minimum.

GLASS, EXPLOSIVES, CHEMICALS

WINDOW GLASS

Discounts from jobbers list, Feb. 1, 1950a Single or Double Thickness

	A quality	B quality
Atlanta	78%	78%
Baltimore	74%d	76%d
Birmingham	82%	83%
Boston	72–10%	72–10%
Chicago	74%	74%
Cincinnati	74%	74%
Cleveland	74–2–10%	74–2–10%
Dallas	75%	75%
Denver	73%	73%
Detroit	74–10–10%	74–10–10%
Kansas City	76–10%	76–10%
Los Angeles	71%	78%
Minneapolis	73–10%	73–10%
Montreal	40–10–5%bc	40–10–5%b
New Orleans	76%	78%
New York	80%	80%
Philadelphia	74%	76%
Pittsburgh	78%	78%
St. Louis	76–10%	76–10%
San Francisco	61%	69%
Seattle	68%	71%

Glass: *a Jobbers' list price per box, 14 x 20, as, $42.75 for A quality, $37.50 for B quality; 14 x 20, ds, $60.00 for A quality, $52.75 for B quality. *b Discount from list, Apr. 1951; sales tax included, but 6% tax exemption not allowable for. *c Single thickness. *d Discount 6/15/52. *e Discount off. 12/31/54.

EXPLOSIVES

Per lb. 40% Ammonia Gelatin in 50 lb. cases delivered in 200 lb. lots*

Atlanta	$0.2465
Baltimore	.2465
Birmingham	.1915
Boston	.2465
Chicago	.2465
Cincinnati	.2465
Cleveland	.2865
Dallas	.2540
Denver	.2515
Detroit	.2465
Kansas City	.2515
Los Angeles	.2490
Minneapolis	.2515
Montreal	22.05h
New Orleans	.2515
New York	.4125g
Philadelphia	.2465
Pittsburgh	.2465
St. Louis	.2515
San Francisco	.2465
Seattle	.2490

Price of 60% Ammonia Gelatin is $1.15 per lb. higher than 40% in U. S., $1.75 per 100 lbs. higher in Canada.

Explosives: * Cartridges of 1¼", 1½", 1¾", 2", 2¼", 2½", 3" diameters. Urban prices influenced by service charges or local storage and delivery regulations do not consistently reflect quantity prices in less congested areas. *g In borough of Kings, Queens, and Richmond and in Manhattan south of Canal St., add delivery charge of $20.00 per trip. *h F.o.b Beloeil (near Montreal), per 100 lb. forcite, 40% Forcite 60%, $23.80

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me	$0.1915	$0.2265	$0.2465
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.1965	.2315	.2515
Rocky Mtn. States	.1965	.2315	.2515
Pacific N. W. States	.1940	.2290	.2490
Pacific S. W. States	.1915	.2265	.2465

PILES, TIES F.O.B.

PILES

Prices per linear foot, fir and pine, bark off, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail Pine*	By Rail Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.51	....
12-in.—2-ft. from butt	6-in.	50 to 59-ft.	.54	....
12-in.—2-ft. from butt	6-in.	60 to 69-ft.	.58	....
12-in.—2-ft. from butt	6-in.	90 to 100-ft.	....	....
13-in.—3-ft. from butt	5-in.	91 to 100-ft.	....	....
14-in.—2-ft. from butt	6-in.	50 to 69-ft.	.50/.68	....
14-in.—2-ft. from butt	6-in.	70 to 79-ft.	.78/.88	.93
14-in.—2-ft. from butt	5-in.	80 to 85-ft.	.83/.93	.94
14-in.—2-ft. from butt	5-in.	85 to 89-ft.	....	1.00
14-in.—2-ft. from butt	5-in.	90 to 100-ft.	....	1.02

* Pine piling over 80-ft. available only in limited quantities

RAILWAY TIES

Prices f.o.b. per tie for carload lots:

		6" x 8" x 8' Untr.	6" x 8" x 8' Tr.	7" x 8" x 8'6" Untr.	7" x 8" x 8'6" Tr.
Birmingham*	Hardwood, Grade 3	$1.70	$2.55	Gr. 5 $2.25	$3.33
	Grade 2	1.50	2.35	" 4 2.10	3.18
	Grade 1	1.15	2.00	" 3a 1.70	2.78
Chicago	Red Oak		3.75a		4.50a
New York	S. L. Sap Pine	2.00	4.00	3.00	5.00
	Mixed Oak	2.50	4.50	3.50	5.50
Philadelphia	Red Oak	2.95/3.15	4.50/4.70	3.60/3.80	5.50/5.75
St. Louis	White Oak	2.50		2.80	
	Red Oak	2.40	2.95a	2.65	3.30a
	Sap Pine or Cypress		2.85a		3.25a
San Francisco	Douglas Fir	2.56ef	3.48ef	3.35bf	5.12af

Tr.—Treated; Untr.—Untreated. a Creosoted. b 7" x 9" x 8'. c Empty cell e Green. f f.o.b. cars. * Add 75¢/tie freight charge to Birmingham.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder in drums f.o.b. works, per 100 lb.	$5.02
Chlorine cylinders, liquid, per lb. f.o.b. works	.103
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, f.o.b. works, ton	29.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	2.30
Soda ash, 58%, in paper bags, per 100 lb. dense	1.70
Sulphate of aluminum, commercial, in 100-lb. bags f.o.b. works	1.85
Sulphate of copper, in bags, 99% per 100 lb. f.o.b. works	14.90

AMBRIDGE *Standard* STEEL JOISTS

Available Now!

IMMEDIATE DELIVERY

USS AMBRIDGE *Standard* Steel Joists provide rigid, economical and light-weight construction suitable for any type of floor, roof and ceiling. The underslung and open web design provides for maximum head room and allows passage of pipes, ducts and conduits in any direction.

In floor construction, the ease and simplicity of handling this new-design steel joist reduces installation time to a minimum and permits other trades to begin work promptly. And for roof construction, AMBRIDGE Steel Joists cut the time required to put structure under cover.

AMBRIDGE Steel Joists are fabricated and assembled on a modern production line basis to assure you a *better* product in *faster* time, thus enabling you to build an economical structure without interruption of your schedule. *Your joists are ready when you are ready for them.*

ASK FOR FREE BOOKLET: For detailed information about the time-and-money-saving advantages of using AMBRIDGE Steel Joists on your next job, get in touch with our nearest Contracting Office, or write direct to Pittsburgh for a free copy of our 36-page catalog.

INTERESTING MOTION PICTURES AVAILABLE—"Building for the Nations" and "The Suspension Bridge," two entertaining and educational films, are now available without charge to business, fraternal and civic organizations, churches, schools and colleges. Write to Pittsburgh office for bookings.

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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMBRIDGE STEEL JOISTS

USS

UNITED STATES STEEL

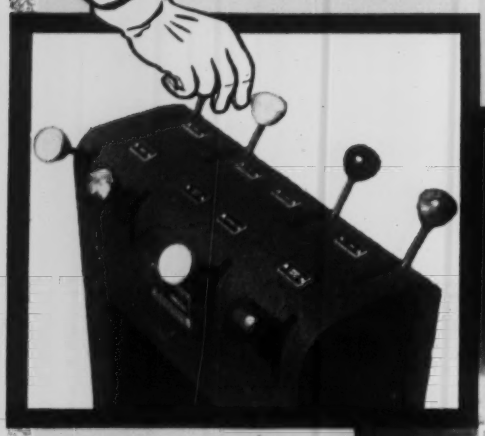
The MADSEN MODEL 481
ASPHALT PLANT

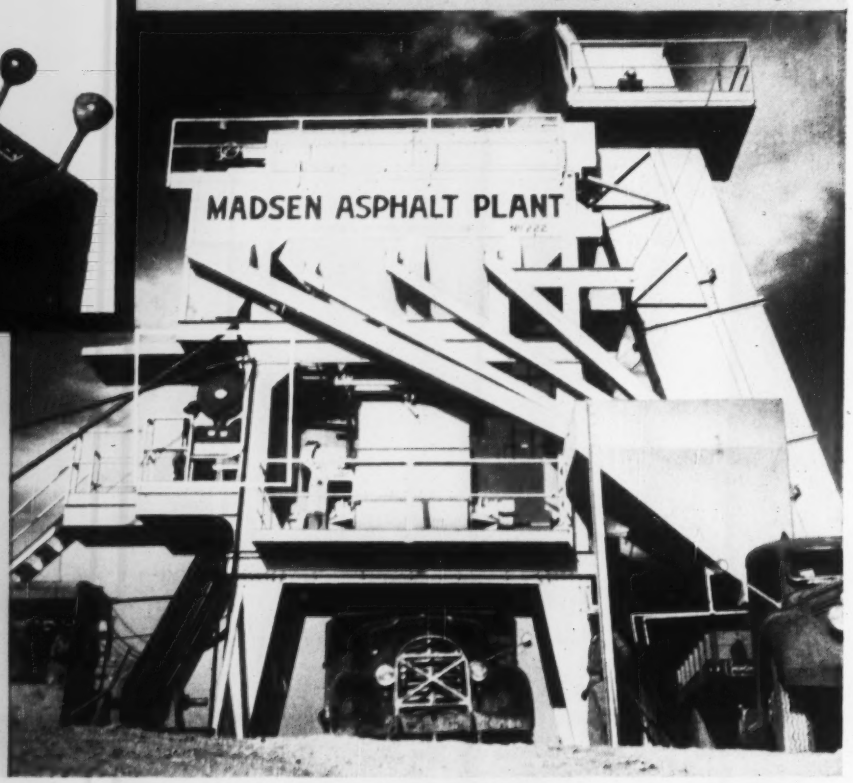
the man at the controls will tell you...

1 ...is easier, less tiring to operate!

2 ...mixes faster, more thoroughly!

3 ...turns out more tonnage per 8-hour day!





MADSEN *Equipment that Serves*

No one gets the "feel" of an asphalt plant like the operator himself. That's why you'll find the men who operate the MADSEN Model 481 Asphalt Plants so enthusiastic in their praise for this outstanding plant.

The MADSEN Model 481 is an easy plant to operate. Weighing and mixing controls are conveniently located for finger-tip action. These eight switch levers (shown in the inset view above) electrically energize the 4-way solenoid-operated air valves which open and close the various gates and the asphalt injection. Because air operation is simple and easy for the operator, it reduces his fatigue thereby increasing his efficiency. And, air operation is fast and accurate which decreases time cycle from bin to truck.

Another original MADSEN feature which the operator likes in this MADSEN plant is the location of the operator station on the end of the plant away from fumes and heat where he has an unobstructed view of in-coming and out-going trucks.

The MADSEN Model 440 Twin-Shaft Pug Mill Mixer used in the Model 481 combined with the MADSEN Asphalt Pressure Injection System (Patented) . . . gives the operator the means of getting the fastest and most thorough mixing action known to the asphalt paving industry.

Talk to the man who has operated the MADSEN Model 481 and check all of the engineering and mechanical advantages of this outstanding plant . . . it's the asphalt plant you will want for the big road-building years ahead.

DO YOU HAVE A COPY OF BULLETIN No. 800 . . . describing the MADSEN Model 481 Asphalt Plant in detail? If not — ask for your copy today.

BLH Construction Equipment Division

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CONSTRUCTION EQUIPMENT DIVISION

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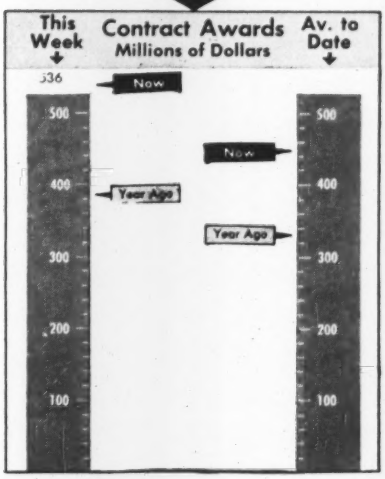
Construction Scoreboard

Activity this Week



AMOUNT OF CONTRACTS LET

By Ownership	This Week	Cum. 16 wks 1956	Chge %
	$ millions		
Federal	$29.9	$564.0	+7
State and Municipal	119.9	1,869.3	+26
Total Public	149.8	3,433.3	+21
Total Private	386.5	4,662.6	+39
U. S. Total	$536.3	$7,095.9	+32
By Type of Work			
Waterworks	$6.7	$90.9	+11
Sewerage	11.3	198.7	+64
Bridges	4.0	172.7	+16
Highways	26.9	678.3	+18
Earthwork, Waterways	12.4	203.8	+16
Buildings:			
Public, Excl. Hsg.	49.5	601.3	+21
Public Housing	0.9	105.6	+69
Private Housing	118.5	2,024.4	+3
Commercial	36.3	627.2	+28
Industrial	325.7	1,771.7	+159
Unclassified	44.1	621.3	+4
U. S. Total	$536.3	$7,095.9	+32

NOTE: Minimum size projects included are: Waterworks and waterways, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000.

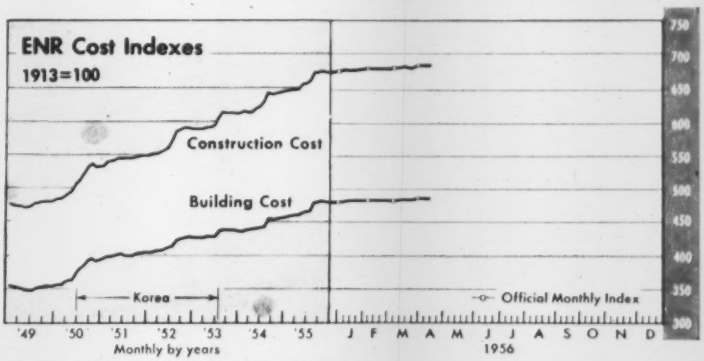
NEW CAPITAL FOR CONSTRUCTION

	Week of Apr. 12	Cum. 15 wks 1956	Chge '55-'56
	$ millions		%
Corporate Securities	$111.3	$892.0	+3
State and Municipal:			
All Except Housing	61.2	1,338.6	+16
Housing	...	20.3	−56
Federal Loans	4.8	34.3	+38
Federal Aid	...	...	...
Total Nonfederal	$177.3	$2,285.2	+9
Federal Appropriations:			
In U. S.	$...	$34.4	...
Outside U. S.	...	...	...
Total New Capital	$177.3	$2,319.6	+11

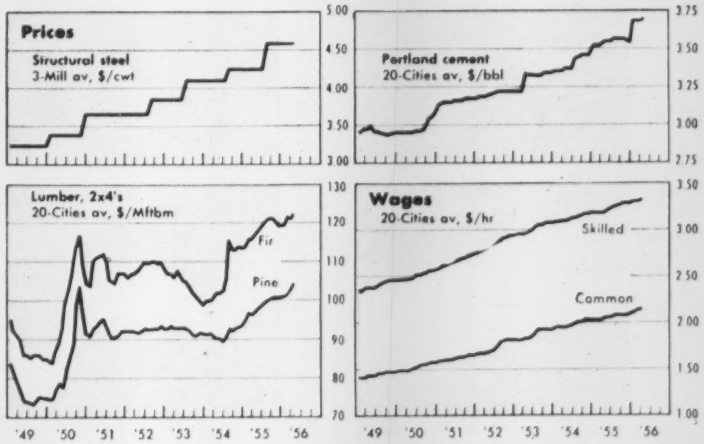
Cost Indexes as of Now

ENR INDEXES (1913 = 100), 20-cities' average	April 12 1956	Percent Change from last Month	Year
Construction Cost	683.34	+0.1	+5.1
Building Cost	185.90	+0.2	+5.3

To convert above indexes to 1926=100: Divide Construction Cost by 2.080; Building Cost by 1.845. To 1949=100: Divide Construction Cost by 4.770; Building Cost by 4.518.



ENR COST INDEX COMPONENTS



ENR COST INDEXES IN 22 CITIES, 1913 = 100

City	Construction Cost April 1956	% change from Month	Year	Building Cost April 1956	% change from Month	Year
Atlanta	502	0	+5.9	424	0	+6.1
Baltimore	595	+0.6	+3.6	483	+2.4	+7.2
Birmingham	549	+0.6	+7.5	447	+0.8	+5.5
Boston	714	+0.3	+3.3	492	+0.4	+7.4
Chicago	774	+0.6	+4.9	498	+1.0	+5.7
Cincinnati	677	+0.5	+5.0	473	+0.7	+5.0
Cleveland	793	+1.0	+4.5	497	+1.6	+5.2
Dallas	511	−0.2	+4.7	426	−0.3	+5.1
Denver	670	+2.3	+5.5	488	+0.2	+3.8
Detroit	778	0	+4.7	505	0	+4.9
Kansas City	744	+1.0	+7.2	499	0	+6.5
Los Angeles	716	+0.3	+7.2	488	+0.4	+7.4
Minneapolis	721	0	+3.5	503	0	+2.3
New Orleans	549	+0.4	+5.0	453	+0.5	+5.0
New York	819	+0.3	+10.0	556	+0.4	+4.8
Philadelphia	722	0	+3.7	536	0	+3.0
Pittsburgh	688	0	+3.2	500	-0	+2.5
St. Louis	759	+0.3	+9.3	526	+0.4	+8.5
San Francisco	697	+0.6	+6.4	476	+0.9	+7.1
Seattle	719	+0.5	+6.1	443	+0.7	+6.6
U.S.—20 cities' avg.	683	+0.5	+5.5	486	+0.5	+5.4
Montreal	552	0	+2.0	429	0	+1.9
Toronto	573	+0.2	+5.5	460	+0.2	+3.6

For ENR cost indexes for preceding years, see insert chart ENR Sept. 29, '55. Extra copies 50 cents.

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HORIZONTAL SHORING

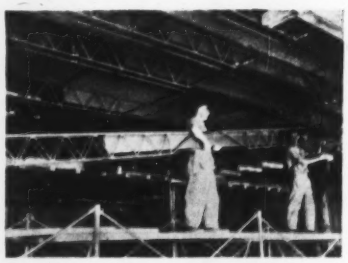
Patent Pending

. . . cuts cost of concrete floor forms up to 40%

S-L Spanall—newest of all-metal, adjustable supports used in suspended formwork—has been generally available for only a few months. Yet it is now being specified and used by engineers and contractors in all parts of the country.

The overwhelming demand for S-L Spanall is due to the time, labor, safety and cost saving ease with which the supports are assembled and the camber adjusted for any given load. It takes but a couple of men to position the supports and set up the forms. And S-L Spanall eliminates cumbersome timber shoring . . . provides the tremendous advantage of clear, unobstructed work areas on floor below . . . has a safety factor of 2.17 and substantially reduces the builder's fire hazard.

S-L Spanall is available immediately for sale or rent. Detailed information and consultation upon request. Please address your inquiry to Dept. E.



Stripping S-L Spanall supports from YMCA Annex in Syracuse, New York. With the web-plate sections telescoped into the lattice sections, S-L Spanall is conveniently stored or shipped for re-use elsewhere.

UNIVERSAL BUILDERS SUPPLY COMPANY, INC.

51 East 42nd Street, New York 17, N.Y.

Clark President George Spatta

"Earthmoving is materials handling on a massive scale so construction is a natural for Clark."

Vice-President Clarence Killebrew

"How do you build a dealer organization? With credit reports, telephone books, shoe leather and a reputation."

The Solid-Gold Tractor-Shovel

A relative newcomer to the construction equipment field has a simple formula for success—double your sales every year. Since its creation in 1954, the Construction Machinery Division of Clark Equipment Co. has had no trouble in hitting that target.

In 1953, sales of the Michigan Power Shovel Co. (which formed the nucleus of the Construction Machinery Division) totaled $5 million. In 1954, sales of the newly formed division bounced up to $12 million. In 1955, construction equipment sales soared to $33 million. The forecast for '56: $60 million.

Many in the field who have watched this meteoric rise have asked two questions: How did Clark get into the construction equipment field? And what's the secret of their almost overnight success?

Three major developments, closely related, marked Clark's entry into this highly competitive field. The first was the postwar construction boom which convinced Clark President George Spatta that there would be an expanding market for construction equipment. Tied in with this was Spatta's succinct philosophy: "Earthmoving is materials handling on a massive scale."

The second development was a merger through which Clark acquired an established line of excavator shovels and cranes. And the third was the choice of the right man to create a new division within Clark to produce, distribute and sell construction machinery.

Convinced that there was a place for Clark in the construction equipment field, Spatta looked around for a man to run the show. His choice was Clarence Killebrew, an official with one of the top equipment producers, who combined a first-rate engineering background with a proven gift for sales organization.

Spatta asked Killebrew to outline the steps Clark would have to take in order to become a success in the construction machinery field. He accepted the plan offered, and gave Killebrew a free hand.

Killebrew's first major move was to put Clark into the tractor-shovel business. It could turn out to be one of the most important decisions Clark has ever made.

The next step came a few months later when Clark acquired the Ross Carrier Corp., a closely held family corporation whose line of straddle trucks supplemented Clark's materials handling equipment.

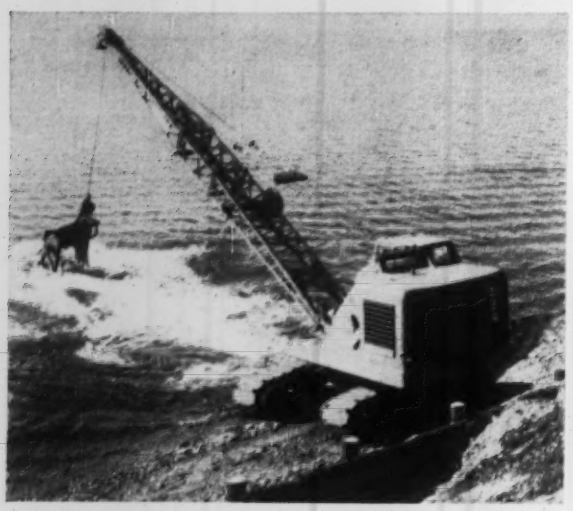
But Spatta and Killebrew were more interested in the Michigan Power Shovel Co., a subsidiary that was included in the Ross deal.

In Michigan Power Shovel, Spatta and Killebrew had an established, well-respected name in the construction equipment field. And, Michigan offered a base or starting point for a razzle-dazzle expansion in capacity, products and sales.

The change came quickly. At the time Clark acquired Ross, sales of Michigan Power Shovel were running about $5 million a year. By the time the first deliveries of the new Michigan tractor-shovel were made (May 1954), Clark was charting new territory.

Sales of the Construction Machinery Division hit $12 million in 1954, more than double the 1953 figure, and then nearly tripled the following year when sales soared to $33 million. Most of the increase was accounted for by the line of tractor-shovels.

And, Clark is counting heavily on



MICHIGAN DRAGLINE was one link with the past. But Clark designers were quick to give established line a "new look."

MICHIGAN TRACTOR-SHOVEL represents Clark's biggest hope for the future, combining versatility with low cost.

the tractor-shovels in reaching the 1956 goal of $60 million. Spatta estimates that roughly half of the sales total is now in tractor-shovels, and the percentage is rising. With some coaching from the front office, a fast-moving dealer organization is pushing the tractor-shovels hard.

There are two reasons for the emphasis on the tractor-shovel at Clark. First, Killebrew and Spatta feel that it is a versatile, rugged, easy-to-handle piece of equipment that has the advantage of a low initial cost.

Secondly, the profit margin is better on a tractor-shovel than on the bigger machines, such as excavator shovels, cranes and draglines. And, it lends itself more easily to mass production economies than the big machines.

• **Engineering gets priority**—For both Spatta and Killebrew, talk of horsepower, torque converters, control valves and sun gears comes naturally. Both men have engineering backgrounds which help explain the Clark preoccupation with design. Killebrew is a mechanical engineering graduate of Alabama Polytechnic Institute, who backed up that education with several years in sales and product research. Spatta also is an engineer, who was in charge of General Electric Co.'s Baltimore switchgear plant until he was picked by Clark's founder in 1927 to join the firm as a development engineer.

One of Spatta's early assignments was to improve the manufacture of axle housings. The result was a new continuous process which enabled Clark to produce the now-familiar banjo axle housings from a single length of welded tubing. The process is covered by one of the many patents issued to Spatta in the automotive field.

This engineering know-how gave Clark a good start in the construction equipment field. After Spatta and Killebrew determined that Clark had all the manufacturing facilities within the organization for engineering design and manufacture of almost all components necessary to build the equipment, the two men tackled the job of designing a new line of machines for Clark.

How did Clark pick its designs? Killebrew listed the specifications for all comparable equipment on the market. Then the engineers designed machines that would match the job requirements. In a way, this was easy.

"Whenever a company with an established line of products makes any extensive design innovations, it makes all of the machines it has produced up until then obsolete. This creates a problem with the dealers and it creates a headache for the manufacturer who must 'work off' an inventory that is out-of-date," Killebrew explains. "But we didn't have heavy inventories to worry about and we had no customer problem. That meant we could go as far as we wanted to—and as fast as we wanted to in designing modern machines. And it paid off."

That's a big element in the Michigan success story. But there's another that is equally important. Clark has been one of the leading manufacturers of heavy automotive drive units. For years, its principal business was in supplying power trains to other manufacturers. This experience led the firm logically to materials handling equipment. And, it was only a short step—from an engineering and production standpoint—from that to construction equipment.

Spatta sums up that part of the Clark story simply. He regards construction equipment as materials handling equipment dependent on the transmission of horsepower through gears from the engine to the point of work. "And, that," he says, "is the same kind of problem we have lived with all our lives."

• **Somebody has to sell them**—Designing a piece of construction equipment is one thing—selling it is something else. As far as design could help sales, the problem was relatively simple. Killebrew insisted, for example, that construction equipment should have "sex appeal."

"It's not enough for a piece of equipment to be good—it must also look good," Killebrew maintains. "If a contractor sees a piece of equipment that looks like something out of the gaslight era, he won't have much respect for it. He'll just feel instinctively that the machine is out of date. We make sure that a Michigan looks like it could handle anything it has to do."

With design problems taken in stride, Killebrew took on a king-size problem: building a sales organization.

The undercapitalized Ross firm that Clark acquired simply did not have the facilities to sell Michigan's line on an aggressive, national basis. But Clark could give Killebrew the money needed to build up a dealer organiza-

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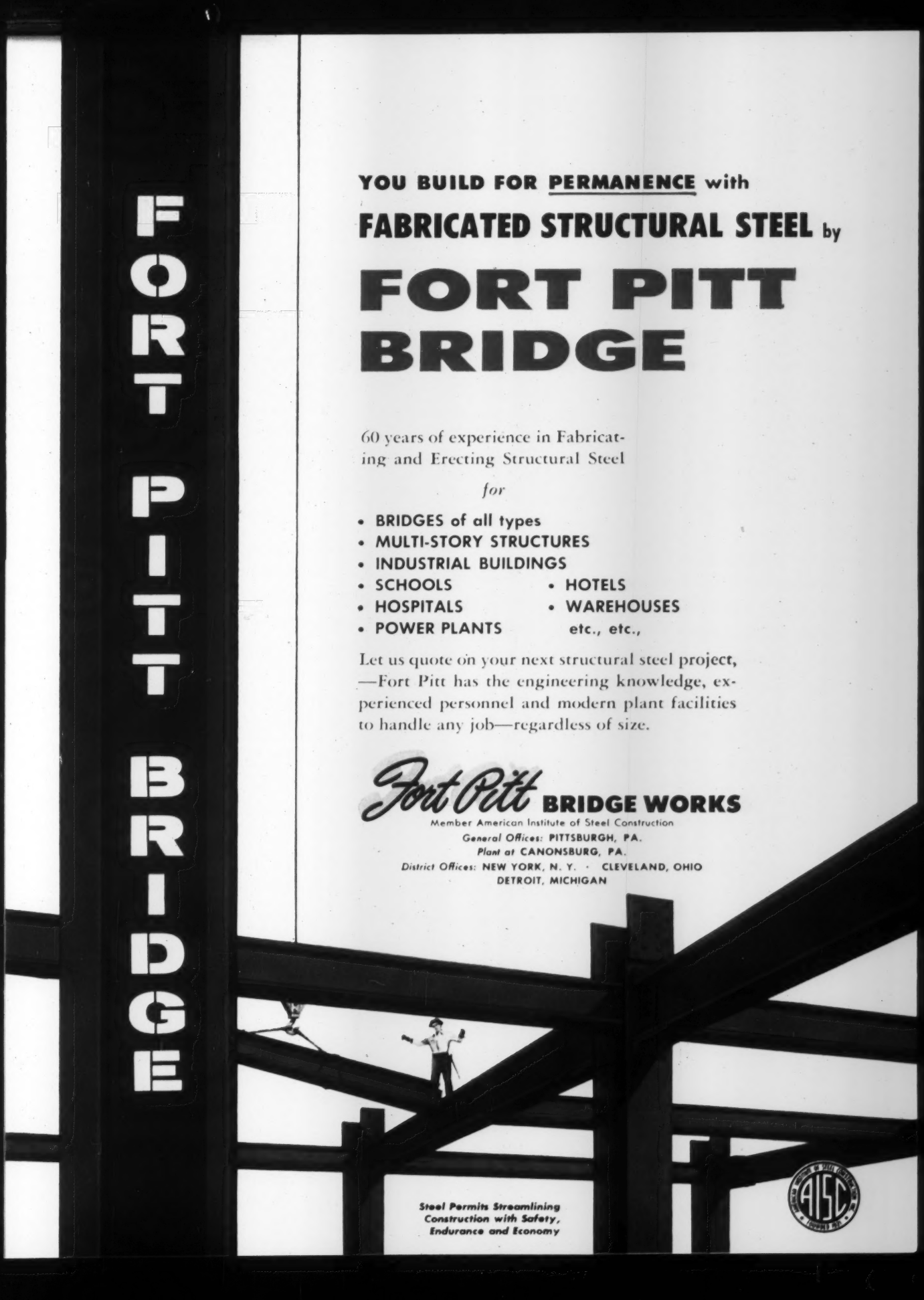

Steel Permits Streamlining Construction with Safety, Endurance and Economy

AISC

tion, and, it could afford an intensive advertising campaign.

Starting with a small group of dealers, Killebrew set out to cover the nation. His first step was to recruit dealers for Michigan. And, to do this, he used almost every trick in the book.

In some areas, dealers for other lines were often quick to solicit Clark for information on Michigan. Some of these soon joined the organization. In other areas, where the Michigan name was not as well known, the problem was more difficult.

In these cases, Killebrew used the services of local "scouts"—market analysts and others—who reported on local men who were good dealer prospects. Killebrew followed up with letters, literature, phone calls and personal visits. Where he had to enter a territory "cold," Killebrew literally walked his way through a couple pairs of shoes. And, all the way through, he checked credit reports, showrooms, space for inventories, local market conditions and construction prospects.

But he had an added weapon—Clark's reputation as a well-established, prosperous and fast-growing firm. It took a year to build a U.S. sales force but Clark now reports a waiting list of dealers who want to sell the Michigan line. Quantity of dealerships is no longer a problem. Killebrew thinks now in terms of quality.

"We're still gaining momentum," Killebrew says. "The salesmen are selling those 12-ton machines with the tactics of the automobile and appliance people—they're inviting customers to 'compare by demonstration' and 'get behind the wheel and test it yourself'."

Killebrew, himself, sells hard. And he has definite ideas on what the contractor wants. He feels, along with many others in the industry, that the trend is toward more usable power, better brakes, torque converters, powershift transmissions and higher speed machines.

But he parts company with some on the so-called "Jack-of-all-trades machines." Says Killebrew:

"We interpret versatility as the ability to do superior work on a wide range of job conditions—mud, sand, rough terrain—rather than expecting a machine to be an all-purpose unit. On that score, I think the trend is toward highly specialized machines."

Carrying out that opinion in terms of new machines means another gamble for Clark, which has already picked up a good stack of chips in a market that calls for a cool head and a large bankroll.

Cement Shortage

Ready-mix official states Midwest will suffer most

Cement will be generally short this year, with the most serious supply problem developing in the states bordering the Great Lakes, a ready-mixed concrete official predicted last week.

Victor Ahearn, executive secretary of the National Ready-Mixed Concrete Association, told ENR that spot shortages of cement may not disappear until the spring of 1957 when the current wave of cement plant expansion is expected to catch up with the construction boom.

While the Midwest will have the most serious cement problem, spot shortages can be expected in many other areas, Ahearn said. New England, for example, is in for trouble in getting enough cement to meet the requirements of its regional construction boom, according to the association official.

Some localities in the nation are confronted with serious shortages today, even though the construction season is not yet in full swing. An example is a small ready-mix plant operator in Minnesota who has been advised by his cement supplier that after May 12 no deliveries will be promised on new orders before November.

Foreign cement is being imported into some states in the Midwest now, Ahearn said. This seems like a repetition of 1955 when midwestern contractors imported cement from Europe.

The shortage of railroad cars threatens cement supplies this year. Cement competes with more than 100 other commodities for covered hopper cars which are used to haul cement in bulk. As industrial production continues to expand, shipments of these competing products increase, reducing the number of cars available for cement. The Middle West, Middle Atlantic and New England states will have the biggest transportation problem, according to Ahearn.

Higher Money Costs Hit Construction

Alarmed over inflationary pressures that have begun to develop, the Federal Reserve Board last week sought to reduce large-scale inventory build-ups and to put some damper on industrial building plans by making money more expensive to borrow.

For the fifth time within a year, the Federal Reserve Board approved an increase in the discount rate—the interest charged by Federal Reserve banks when they lend money to member banks.

The rate went from 2½% to 2¾% in the New York, Boston, Philadelphia, Cleveland, Richmond, Atlanta, St. Louis, Kansas City, and Dallas districts. In two other districts—Minneapolis and San Francisco—the rate jumped from 2½% to 3%. The Chicago district has not yet raised its rate from the present 2½% level but is expected to do so shortly.

Effects of the higher discount rates were felt quickly. Several New York City banks immediately boosted the prime rate from 3½% to 3¾%. The prime rate is the minimum interest rate charged business borrowers with top credit standing. The new prime rate is the highest since the early '30s.

Construction will feel some of the impact shortly. Since the higher money costs will affect corporate borrowing for plant expansion, some marginal projects may be postponed until later in the year.

However, public works projects may be hit harder than industrial building. Municipal bonds, which have been marked by rising yields, will have to carry larger interest rates to compete with other segments of the bond market. And the move will tighten the screws on the mortgage market. This could hurt housing.

Business Briefs . . .

• **Go slow**—The Interstate Commerce Commission won't enforce its ban on deliberate slow-routing of loaded freight cars until an Oregon court rules on the order. Douglas fir lumber shippers operating in the Pacific Northwest would be hard hit by the new ruling.

• **Housing starts**—Although March housing starts were 23% higher than February, the upturn was less than expected. The seasonally-adjusted annual rate of privately-financed homebuilding fell to the lowest level since May 1954.

• **Bridge can't cross financing obstacle**—Construction of an $18-million bridge over Hood Canal in northwest Washington State cannot be financed by a revenue bond issue at this time, Blyth & Co., a New York investment firm, told the Washington Toll Bridge Authority.

THE RED TRIANGLES INDICATE STRUCTURES BUILT ON RAYMOND FOUNDATIONS

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THE SHORTAGE OF SCIENTISTS AND ENGINEERS:

How Critical Is It?

The United States is running into a serious shortage of scientists and engineers. There is no novelty in this observation. It has often been made in the last few years. And there has been mounting alarm about what this shortage may mean for both our national security and our prosperity.

There would be great novelty, however, if general agreement were attained on such important matters as the size of the shortage, the extent of the damage it threatens to inflict, and the best ways to eliminate it. The purpose of these editorials is not to provide this novelty, but to ventilate some of the key aspects of the shortage of scientists and engineers.

This first editorial in the series is designed to throw light on the over-all dimensions of the shortage. Others to follow will be addressed to such questions as:

- How serious is the threat to our economic well-being and to our national security?
- What needs to be done to prevent the shortage from becoming critical?

Rise Has Been Rapid

The problem is *not* that we have been producing a small number of engineers and scientists. Indeed, the number has risen sharply. We now have a working force of more than 600,000 engineers, over twice as many as the 286,000 there were in 1940. And we have about 250,000 scientists (chemists, physicists, biologists, geologists, mathematicians, etc.), compared to only 92,000 in 1940. About one in 148 persons in the labor force of 1940 was a scientist or engineer; today the ratio is about one in every 80.

In research and development work, where highly creative scientific minds are required, there has been fully as rapid a rise in employment of scientists and engineers. Fewer than 90,000 were employed in research and development fifteen years ago; the total now exceeds 200,000.

—But Not Rapid Enough

Despite this rapid increase in the number of scientists and engineers—at a rate much faster than the increase in the labor force as a whole—the needs of industry, government and education for technically trained people have risen even more sharply.

The principal reason for this mounting demand is the prodigious growth of research in the last 15 years. From a total of only about $900 million spent on all types of research in 1941, the annual expenditure rose to over $5 billion by 1953 (the latest estimate available). Over two-thirds of the research is done by private industry, mostly to develop new and better products and to find new and better methods of production. Most of the rest is performed by the government, largely to develop improved and inevitably more complex scientific weapons.

One aircraft company has found from its own experience that it required 17,000 engineering manhours to develop a typical fighter plane in 1940. The requirement is now about 1.4 million engineering manhours. Development of the typical fighter plane of 1960 will require well over 2 million engineering manhours.

In this dramatic example, the need for engineering services for a basic piece of military equipment soared 80 times in 15 years. It is an indication of why the demand for more and more technically trained men and women has outstripped even the imposing increase in scientific and engineering manpower of the last decade and a half.

Size of the Gap

Exactly how great the gap is between the available supply of scientists and engineers and the number required, it is impossible to say. In some instances technical talent undoubtedly could be better used than it is now. And part of the shortage might "disappear" if higher salaries had to be paid. (These questions will be discussed in later editorials.) But informed estimates of the approximate size of the gap can be given.

- According to the best available information, from estimates by the Engineers' Joint Council and the U. S. Bureau of Labor Statistics, **the minimum need for engineers from graduating classes is 40,000 each year for the next ten years.** Last year we graduated only 23,000 engineers, just about enough to cover replacement needs without allowing for any expansion of the number of active engineers. Projections made by the U. S. Office of Education indicate that we shall probably not have a class of 40,000—the *current* annual requirement—until 1963.
- According to Dr. Howard Meyerhoff, executive director of the Scientific Manpower Commission, **there is now a shortage of about 20,000 scientists.** Last year the number of doctoral degrees in the natural sciences, almost a prerequisite for research work, was only 5,000. Dr. Meyerhoff estimates that the shortage of scientists will rise another 30,000 by 1960.

More Needed As Teachers

Not all of the graduates with scientific and engineering training, furthermore, will work as scientists and engineers—that is, by performing research and giving it practical application. Such training is now necessary in many sales and management positions. And more of our technically trained men and women must remain in educational institutions as teachers if the quality of engineering and scientific education is to be maintained. A survey in 1954-55 by the National Education Association showed that, out of 277 universities, state colleges and large private colleges, nearly one-third *already* had unfilled vacancies in engineering and three-fourths had vacancies in physical sciences.

The dimensions of the shortage of scientists and engineers can be summarized as follows: **Despite a substantial rise in the trained manpower available, the needs of industry, the government and education have risen still faster. The best information indicates that, on the basis of current and anticipated needs, our recent yearly rates of production of slightly over 20,000 engineers and about 5,000 PhD's in natural sciences could be doubled without closing the gap entirely.**

The disturbing implications of this shortage for our national security and our prosperity and some practical suggestions for eliminating it will be the subjects of subsequent editorials in this series.

This is one of a series of editorials prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

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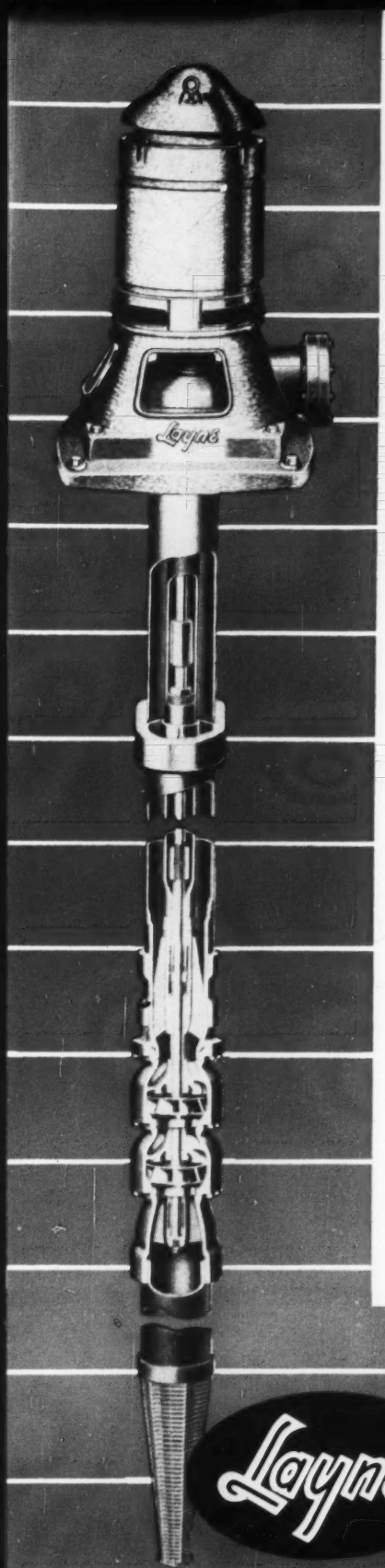

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Welfare Funds

Senate committee proposes registration, disclosure

Federal registration and inspection of welfare and pension plans has been recommended by a special subcommittee of the U. S. Senate.

The proposal is the result of a study begun in 1954, at President Eisenhower's request. Now under the chairmanship of Sen. Paul Douglas (D., Ill.), the committee was originally headed by Sen. Ives (R., N. Y.).

Under the committee's proposal, for which a bill is now being drafted, registration requirements would be imposed on all employe welfare and pension plans covering 25 or more workers, whether privately established or resulting from collective bargaining. Annual financial reports would be required for funds affecting 100 or more employes and investment disclosure would be mandatory for plans with reserve funds.

According to the committee, more than 29,000,000 workers are beneficiaries of plans. Total assets approach $25 billion. Bulk of the plans, the committee reports, are responsibly administered, but it discovered many instances where the workers' rights are being "dangerously ignored."

Administration abuses were vehemently attacked by the AFL-CIO at its founding convention. It then adopted a rigid code of ethics and urged legislative action on the federal level.

Sen. Douglas has indicated the committee's proposal will leave room for regulatory action on the state level, where the issue has been under active consideration.

Labor Secretary Mitchell Lauds Carpenters and IBEW

Secretary of Labor James P. Mitchell last week lauded the United Brotherhood of Carpenters and Joiners of America and the International Brotherhood of Electrical Workers for their leadership in serving the interests of their members.

Use of the trade union movement to promote the "unwholesome and selfish purposes" of those few who have "emerged from the underworld," Mitchell said, has "soiled the name of good trade unions with the muck and the crime of racketeering," damaging the whole union movement as well as the individuals the unions are supposed to serve. He urged those who wish to strengthen organized labor to see that the menace is not allowed to go unchecked.

Mitchell's remarks to the carpenters were made in an address before a regional convention in Philadelphia, celebrating the 75th anniversary of the union's founding. His commendation of IBEW was made before the union's Local 3 in New York.

During the carpenters' convention, the union's general president, Maurice A. Hutcheson, took the opportunity to remind the nation that neither major political party has a monopoly on the labor vote. He said his union would favor political candidates "who, not by words but by deeds, further the prosperity of all our people."

Hour of Decision

ILA-Teamster pact is referred to AFL-CIO

Dave Beck and his teamsters union came to another crossroads this week—a showdown with the AFL-CIO on the teamsters' alliance with the estranged International Longshoremen's Association. A special meeting of the AFL-CIO Executive Council has been called for May 1.

Beck held an inconclusive conference on Monday with President George Meany, who was reported ready to start suspension proceedings if the alliance is continued. Although the controversial $400,000 loan to the ILA was killed in Honolulu (ENR April 5, p. 156), Meany has indicated further action is necessary. Beck, to whom the pact appears to be a jurisdictional agreement, claims the alliance does not violate the AFL-CIO constitution.

Last week, the International Brotherhood of Longshoremen, chartered by the AFL after the 1953 ouster of ILA, urged Meany to suspend the teamsters if they insist on consummating the ILA agreement.

Meanwhile in New York, incumbent president Martin Lacey won the first round in the court fight for control of the teamsters' Joint Council (ENR April 12, p. 120). John O'Rourke, who claims to have won the election and who has the support of James Hoffa (central figure in the ILA affair), failed to get Lacey's request for an injunction thrown out of court and the case was headed for a full hearing this week.

Canadian Shortage

More construction workers needed in the Northwest

Government, management and labor officials in British Columbia met in Vancouver earlier this month to prepare for an estimated 17,000-man shortage in the construction, logging and mining industries within the province this summer.

Taking part in the unusual exploratory talks designed to test reaction to suggested relaxation of overtime regulations so the labor force could handle more work, were representatives of the Building and Construction Industries Exchange; Canadian Manufacturers' Association; B. C. Industrial Association; Board of Industrial Relations; B. C. Federation of Labor (CCL); and B. C. Trades Union Congress (TCL).

Labor Minister Lyle Wicks, who called the conference, warned that a severe shortage of skilled labor is developing as the peak construction period approaches. Similar warnings have come from Trade and Industry Minister Ralph Chetwynd and the National Employment Service in Vancouver, which has singled out heavy construction, public utilities and government projects as those that promise to be most severely hit.

Several lines of action were suggested by Wicks to meet the shortage: bringing workers from other parts of Canada or other countries; working extra hours; upgrading unskilled or semi-skilled men through training programs; drawing on the "great pool" of older workers in the province.

According to Wicks, labor seems to feel that the present force will be able to handle the situation, although some unions are already querying eastern units about available manpower. Business is reported to be quite concerned and thinks plans should now be made to meet the emergency.

Overtime is rigidly controlled by labor law and the unions have stood firm against its relaxation.

The National Employment Service reports that employment is now higher than it's been anytime since 1947, when the West Coast was swinging back from war to peacetime economy.

Another result of the province's unprecedented expansion is that the professional manpower supply is not being replenished as fast as it's used.

(*Labor continued on page 158*)

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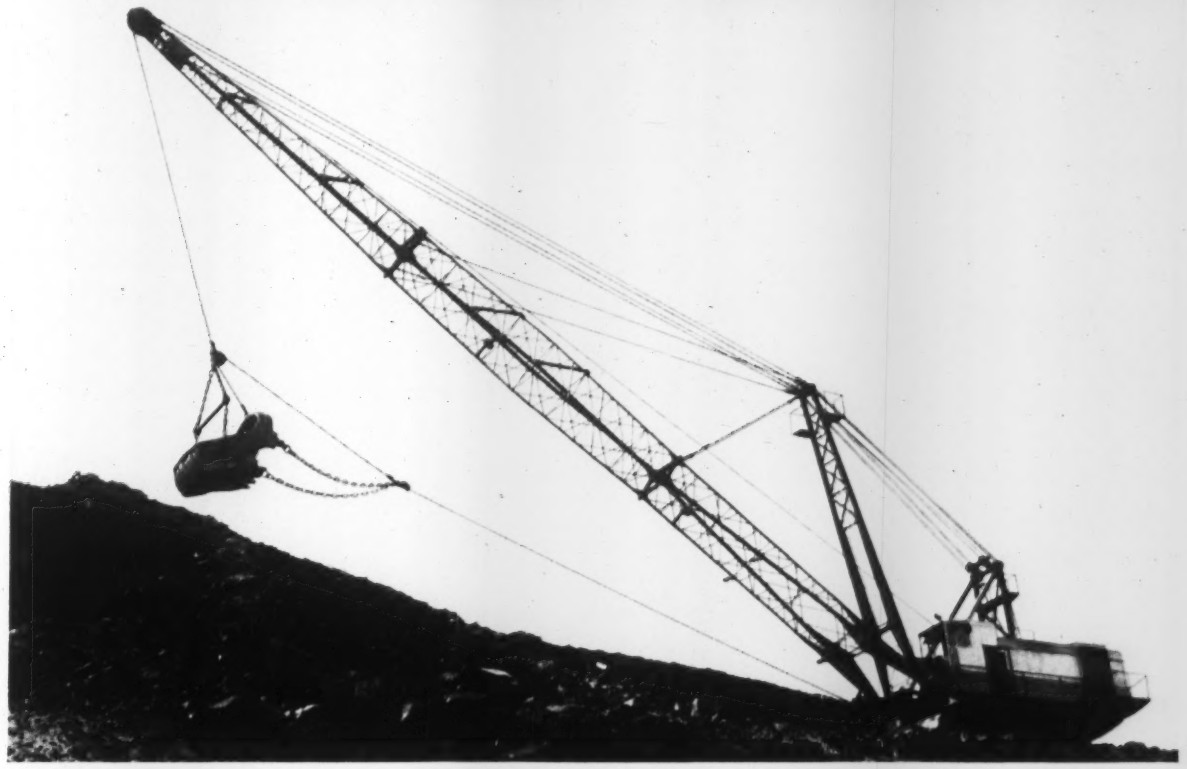

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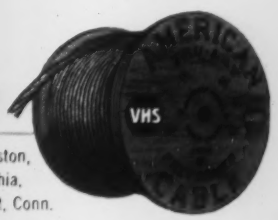

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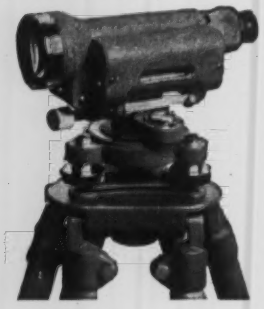

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Maloney Renamed

Operating engineers hold stormy Chicago convention

The International Union of Operating Engineers last week renominated William E. Maloney as president.

The action was taken at the union's stormy 25th convention held behind closed doors in Chicago. With a claimed membership of 241,391, the operating engineers are one of the key unions in heavy construction.

During the course of the convention, the union was praised for its contribution to the success of the National Joint Board for the Settlement of Jurisdictional Disputes and for its efforts to promote use of two and three-year contracts to help stabilize construction costs. Maloney was personally lauded by Labor Secretary Mitchell for his cooperation in the government's war-time construction program.

But the big problem before the convention stemmed from charges of corruption leveled at the union, primarily from within its own ranks. As the convention moved into its second day, reporters were barred—because of the confidential nature of the sessions and because of the "unfair and malicious" coverage the press was said to be giving.

Specific issues relating to corruption charges included reinstatement of Joseph Fay, a former vice president who had been suspended, and of two men dropped from William DeKoning's New York Local 138. Included in the "reform" efforts was introduction of a resolution inviting the U. S. Attorney General to launch a full-scale investigation.

Although the union was apparently able to keep the issue within the family for the time being, the suspended New York members have appealed to AFL-CIO President George Meany, and have threatened to take their case to court.

Sheet Metal Workers Win Pay Increase of 40 Cents

A two-year contract granting substantial wage increases brought an end last week to a 10-day strike by sheet metal workers in New Mexico's four largest cities.

The contract, which covers 24 northern New Mexico counties, was signed by Local 49 of the sheet metal workers union and the New Mexico Sheet Metal Contractors Association. It calls for the following increases:

- An immediate wage increase of 20 cents, raising the basic rate to $3.20.
- Another 20-cent wage boost next April 1.
- An additional one cent to the welfare fund, boosting welfare payment to 8½ cents an hour.
- A 25% increase in base pay for those engaged in hazardous work.
- Payment of 25 cents an hour above base pay for foremen supervising four or less workers; 40 cents an hour for foremen of larger groups.
- An extra 1½ cents a mile travel pay for out-of-town jobs, making the total 10 cents per mile.

When the strike began on April 1, the union had asked for a two-year contract with a 25-cent increase each year. The contractors had offered 15 cents.

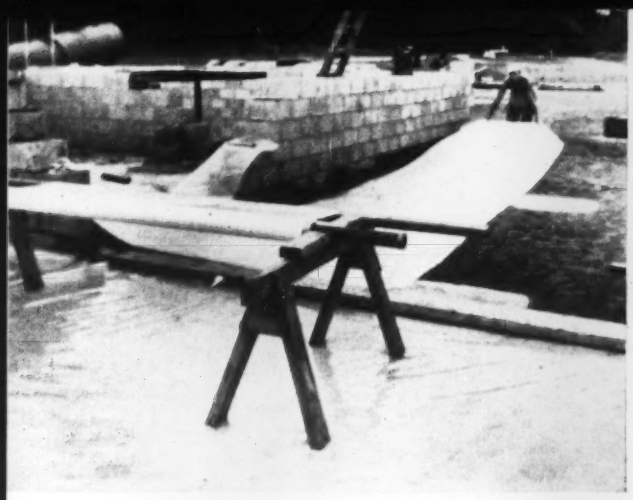
Labor Briefs . . .

- **Laborers Settle**—A week-long strike of building laborers in Massillon, Ohio, has ended with acceptance of a new contract granting a 20-cent wage increase, with 15 cents effective now and another 5 cents scheduled for August 1. Average rates now range from $2.25 to $2.75 an hour.

- **Connecticut rates**—New contracts in Norwich boost the bricklayers scale to $3.25 and, effective August 1, will raise carpenters to $3.00. The three-year carpenter contract, granting a total increase of 47 cents, gives 27 cents on August 1 and 10 cents each of the next two years. Bricklayers won a flat 25-cent boost.

- **Secondary boycott?**—Jack Lacoste Co., Cleveland, Ohio, contractor working on a water filtration project for Willoughby, Ohio, has referred to the NLRB a labor dispute that the company says has its origin in Maysville, Ky., where it is building a pumping station for the Army. The company claims several trades are striking the Willoughby project in protest against use of non-union labor on the Maysville work.

- **State mergers**—Louisiana and Tennessee AFL and CIO state labor groups last week completed their mergers on the state levels. Victor Bussie of Shreveport heads the new Louisiana State Labor Council AFL-CIO and Stanton E. Smith of Chattanooga is president of the Tennessee Council. Number of consummated state mergers now stands at three, Arkansas having led the way last month.



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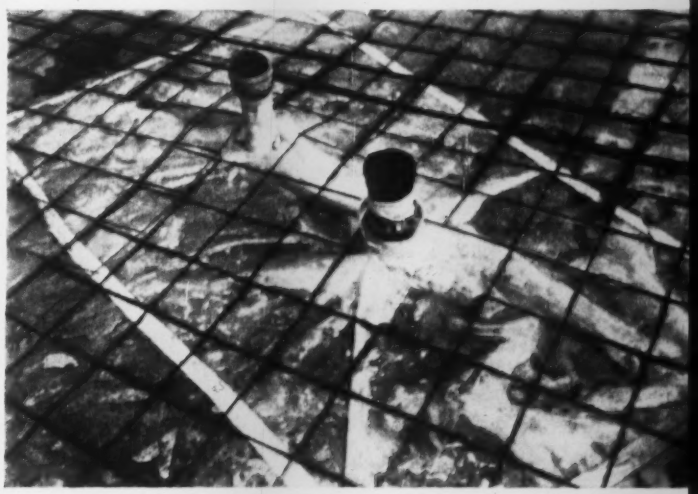

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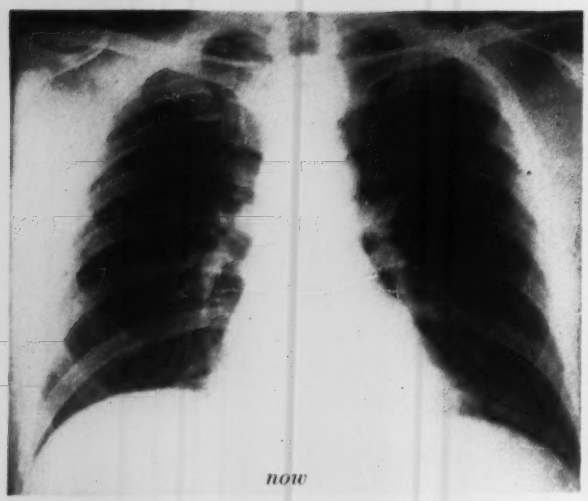

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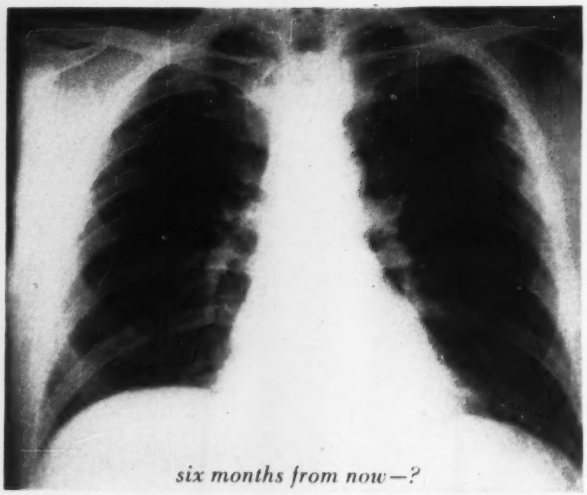

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American Cancer Society

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DISTRICT No. 2, Lacy Ketchum, District Engineer, 109 No. Genesee St., Utica, N. Y.						
Hamilton	FARC 56-81	Hope Center-Wells, Pt. 2, S.H. 5268 Wells-Speculator, Pt. 1, S.H. 5514 Proj. F-1036(4)	3.49	9" Cem. Conc. Pavt. 22' Wide = 3.47 Mi. Misc. Work = 0.02 Mi. R.C. Slab Br. 26'	$39,000 Plans $15	711,000
Herkimer	FARC 56-25	Mohawk-Jacksonburg-Little Falls, S.H. 8401 Project F-517(4)	3.38	Asph. Conc., Opt.	$23,000 Plans $15	421,000
Herkimer	FARC 56-10	Cedarville-West Winfield, S.H. 871 Project S-460(1)	1.51	Asph. Conc., Opt.	$12,000 Plans $10	212,000
Madison, Oneida & Chenango	FARC 56-14	Sherburne-Furman Mill, S.H. 705 Furmans Mills-Hubbardsville, S.H. 8297 Hubbardsville-North Brookfield S.H. 8203 North Brookfield-Waterville, S.H. 840 Project F-456(7)	7.88	Asph. Conc., Opt. = 7.79 Mi. Misc. Work = 0.09 Mi.	$65,000 Plans $25	1,140,000
Montgomery	FARC 56-11	Fonda, East, S.H. 152 Fonda-Tribes Hill, S.H. 303 Mohawk River Turnpike, Amsterdam-Tribes Hill, S.H. 108 Project F-349(11)	4.41 (1.31) (Acc.)	9" Cem. Conc. Pavt. 24' 48' Wide = 4.30 Mi. Asph. Conc., Opt. = 1.16 Mi. T.C. Graded Grav. = 0.26 Mi.	$90,000 Plans $25	1,642,000
DISTRICT No. 3, William Robinson, District Engineer, Weigh Lock Building, Syracuse, N. Y.						
Cayuga	FARC 56-12	Auburn-Weedsport, S.H. 1317	7.24	Asph. Conc., Type 1A	$63,000 Plans $15	1,146,000
Cayuga	FASH 56-1	Village of Weedsport; Seneca St. Proj. F-1114(1)			$54,000	985,000
Cayuga	FARC 56-19	Groton-Lock Moravia, S.H. 1016 Project F-610(6)	6.55	Asph. Conc., Type 1A 2 R.C. Closed Box Brs. 16' & 55.5' 1 Timber Trestle Ext. 45.2'	$54,000 Plans $15	985,000
Oswego	FARC 56-99	Pulaski-Williamstown, Pt. 1 & Pt. 2, S.H. 1288-972 Project F-533(4)	10.20	Asph. Conc., Type 1A	$50,000 Plans $25	906,000
Oswego	FASS 56-2	Swamp Road (Co. Rd.) Project S-448(1)	3.58	Bit. Mac., Opt. Rd. Mix	$18,000 Plans $10	332,000
Seneca	FARC 56-20	Interlaken-Trumansburg, S.H. 5416 Project F-491(2)	3.98	Asph. Conc., Opt.	$23,000 Plans $10	398,000
Seneca	FASS 56-1	Town Line Road, C.R. 138 Project S-386(1)	1.78	Asph. Conc., Opt.	$9,500 Plans $10	175,000
Seneca	FARC 56-23	Geneva-Waterloo, Pt. 2 & 3, S.H. 8240 Waterloo Village-Main St., S.H. 5709 Waterloo Village-Main St., Pt. 2, S.H. 9252 Waterloo Village, S.H. 1211 Project F-406(3)	1.54	Asph. Conc. Type 2A = 1.44 Mi. Misc. Work = 0.10 Mi.	$37,000 Plans $10	635,000
DISTRICT No. 4, R. F. Perry, Acting District Engineer, Barge Canal Terminal, Rochester, N. Y.						
Genesee	FAC 56-14	Batavia City-Oak Street Arterial (Main St. to North City Line) Project US-93(2)	1.11	Asph. Conc., Type 2A = 0.92 Mi. Widening & Misc. Wk. = 0.19 Mi.	$25,000 Plans $15	467,000
Wyoming	FARC 56-94	Warsaw-Gainesville, S. H. 5400 Project F-380(7); S-477(2)	3.18	Asph. Conc., Opt. = 3.13 Mi. Misc. Work = 0.05 Mi. I-Beam Br. 44	$40,000 Plans $25	696,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, 65 Court St, Buffalo, N. Y.						
Erie	FAC 56-2	City of Tonawanda: Seymour St. Project U-1078(7)	0.34	Asph. Conc., Type 2A = 0.31 Mi. Misc. Work = 0.03 Mi.	$9,000 Plans $10	159,000
Niagara	FAC 56-18	Walnut Street Arterial (Washburn Street to Pound St.); City of Lockport Project U-709(5)	0.42	Asph. Conc., Opt. = 0.40 Mi. Misc. Work = 0.02 Mi.	$10,000 Plans $10	181,000
DISTRICT No. 6, J. H. Thomas, District Engineer, 30 W. Main St., Hornell, N. Y.						
Allegany	FARC 56-26	Canaedea-Fillmore-Hume, S.H. 5518 Fillmore-Portageville, Pt. 1 & Pt. 2, S.H. 9210-8228 Project F-380(5)	3.53	9" Cem. Conc. Pavt. 22' & 38' Wide = 3.51 Mi. Misc. Work = 0.02 Mi. Comp. I-Beam Br. 127'	$45,000 Plans $15	818,000
DISTRICT No. 7, R. W. Sweet, District Engineer, 444 Van Duzee St., Watertown, N. Y.						
Clinton	FARC 56-22	Cadyville-Moffitsville, S.H. 822 West Plattsburg, S.H. 776 Proj. F-645(2)	8.69	Asph. Conc., Opt. 2 Closed Box Brs. 22' & 24'	$73,000 Plans $50	1,318,000
DISTRICT No. 8, J. S. Bixby, District Engineer, Pleasant Valley Road, Poughkeepsie, N. Y.						
Columbia	FARC 56-13	Chatham-Chatham Center Pt. 1 & Pt. 3 & Pt. 2, S.H. 1563-342; Chatham Center-Riders Mills, S.H. 827 Project S-370(2)	4.19	Asph. Conc., Opt.	$34,000 Plans $15	605,000
Orange	FARC 56-15	Port Jervis-Sullivan County Line, Pt. 1, S.H. 412 Port Jervis-Mongaup, S.H. 8424 Project F-502(15)	2.63 (0.50) (Acc.)	9" Cem. Conc. Pavt. 24' Var. Wide = 2.61 Mi. Misc. Work = 0.02 Mi. (Cem. Conc. Pavt. Acc. Rd. = 0.26 Mi.) (Asp. Conc., Opt. Acc. Rd. = 0.24 Mi.)	$38,000 Plans $15	697,000
Rockland	PIP 56-2P	Palisades Interstate Parkway Sect. 2 & Pt. 1 (Route 59 to Route 45)	5.77	8" Cem. Conc. Pavt. 2 @ 24' Wide	$110,000 Plans $50	1,966,000
Rockland	PIP 56-3P	Palisades Interstate Parkway Sect. 2 (N.J. State Line to Rte. 303)	2.37 (0.43) (Acc.)	8" Cem. Conc. Pavt. 2 @ 24' Wide	$50,000 Plans $25	965,000
Ulster	FARC 56-16	Wurtsboro-Ellenville, S.H. 8080 Project F-380(2)	4.19	Asph. Conc., Opt. Ext. Exist. 22' Slab Br.	$25,000 Plans $10	455,000
DISTRICT No. 9, F. J. Weber, Acting District Engineer, 71 Frederick St., Binghamton, N. Y.						
Delaware	FARC 56-17 R.C. 56-18	Andes-Margaretville, S.H. 8017 Margaretville-Halcottsville, S.H. 5384 Project S-459(1)	0.48	9" Cem. Conc. Pavt. 32'-40' Wide = 0.36 Mi. Asph. Conc., Opt. = 0.09 Mi. Misc. Work = 0.03 Mi.	$16,000 Plans $15	300,000
Chenango	FARC 56-21	Sherburne-Earlville, S.H. 5568 Earlville-Hamilton, S.H. 5585 Project F-691(4)	4.50	9" Cem. Conc. Pavt. 24' Wide 2 Comp. I-Beam Brs. 57' & 65'	$75,000 Plans $25	1,365,000
Otsego	FARC 56-24	East Springfield-Cherry Valley, S.H. 934 Cherry Valley-Sharon Springs, Sharon Springs-Canajoharie, Pt. 1, S.H. 8064 Project F-65(4)	6.54	Asph. Conc., Type 1A	$30,000 Plans $10	531,000
DISTRICT No. 10, M. E. Gould, District Engineer, Montauk Highway at Little East Neck Rd., Babylon, L. I., N. Y.						
Bronx	Fiebe 56-1	Cross Bronx Expressway Contract 7 (Fulton Ave. to Longfellow Ave.) Project IN-1084 (23)	1.00 (1.84) (Acc.)	9" Cem. Conc. Pavt. with Carbon Black 2 @ 36' Wide = 0.82 Mi. Misc. Work = 0.18 Mi. (Acc. Rd. Cem. Conc. Pavt. = 0.28 Mi.) (Acc. Rd. Sheet Asph. = 1.56 Mi.) 4 Hy. Segs. Rig. Frames, 98', 84.5', 99' & 99' 1 Hy. Sep. R.C. Arch 110.4' 1 Hy. Sep. Steel Girder 116.4'	$450,000 Plans $100	8,375,000
Bronx	Fiase 56-1	Arthur V. Sheridan Expressway Contract 1 Project IN-1086(2)	0.93	Demolition of Buildings	$9,000 Plans $10	170,000
New York	CBE RC 56-2	Cross Bronx Expressway (Highbridge Interchange Cont. 130) Fac Be 50-1	80.13	Remove Exist. Reinf. Conc. Pavt., phalt Conc., Opt. and Misc. Work	$1,300 Plans $10	25,000

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts and Accounts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specification, and contract agreement, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "STATE OF NEW YORK, COMMISSIONER OF TAXATION AND FINANCE" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

When optional types are permitted on contracts with federal funds, bidders must state in the space provided in the proposal the exact designation of the optional type upon which the proposal is predicated.

The right is reserved to reject any or all bids.

JOHN W. JOHNSON
SUPT. OF PUBLIC WORKS

OFFICIAL PROPOSALS

Bids: May 8, 1956

Contract BP-120.001

ADVERTISEMENT
THE PORT OF NEW YORK AUTHORITY
BROOKLYN-PORT AUTHORITY PIERS
PIER NO. 11
DEMOLITION OF PIERS 35 & 36
DREDGING, BULKHEAD AND FILL

Sealed proposals for demolition of Piers 35 and 36, dredging and construction of a bulkhead and fill for proposed Pier 11 at Atlantic Basin, Brooklyn, New York, will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, May 8, 1956, at which time said proposals will be opened and read in Room 1108.

Contract documents may be seen at the office of the Engineer of Design of the Authority, Room 1112. Documents will be furnished upon deposit of $30.00 per set for not more than three sets to any one company (each set including one copy of the contract drawings). Additional sets will be furnished upon payment of $30.00 per set, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt in duplicate will be issued. A copy of the receipt shall be delivered to Room 1112, where the documents will be furnished.

Those who have submitted a bid on the contract will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman

New York, April 19, 1956

Bids: May 17, 1956

Construction of Bridge

COMITE EJECUTIVO DE VIALIDAD DE LA PROVINCIA DEL GUAYAS

Notice is hereby given that the Comité Ejecutivo de Vialidad de la Provincia del Guayas will receive bids on or about May 17th, 1956, for the construction of the Sub-Structure of the Daule River Bridge in the Province of Guayas, Ecuador.

This contract is for the construction of concrete anchorages, piers, and 2 fifteen meter approach spans, with abutments, for a two hundred meter span suspension bridge. The superstructure will be erected under a separate contract.

The Sub-Structure has been designed by Michael Baker, Jr., Inc., Rochester, Pennsylvania.

The following approximate quantities will be included in this contract:

Structure Excavation	8,500 cu met.
Concrete (Class "X")	6,170 cu met.
Concrete (Class "A")	1,100 cu met.
Reinforcing Steel	460,000 lbs.
Structural Steel	92,500 lbs.
Anchorage Fill (sand and gravel)	2,800 cu met.
Pier Piling	3,300 lin met.
12" Monotube Piling	180 lin met.
Steel Sheet Piling	880 sq met.

Further information may be obtained by writing the Principal Director of the Comité Ejecutivo de Vialidad, Casilla N2 4182, Guayaquil, Ecuador, S. A."

Bids: May 1, 1956

Contract O & M — 351

ADVERTISEMENT
THE PORT OF NEW YORK AUTHORITY
GEORGE WASHINGTON BRIDGE
RESURFACING PORTIONS OF
NEW YORK APPROACHES

Sealed proposals for furnishing all labor, material and equipment for resurfacing portions of the New York Approaches of the George Washington Bridge will be received at the office of the Department of Purchase and Administrative Services of The Port of New York Authority, Room 200, 111 Eighth Avenue, New York 11, until 11:00 A.M., Tuesday, May 1, 1956, at which time and place said proposals will be opened and read.

Contract documents may be seen at the office of the Department of Purchase and Administrative Services, Room 900, and copies will be furnished upon deposit of $10.00 per set. Deposit must be delivered to Treasury Department, Room 1001, where a receipt in duplicate will be issued. The duplicate copy of the receipt is then to be delivered to the Department of Purchase and Administrative Services, and you will be furnished with the contract documents. The deposit will be remitted if the documents are returned in good condition, not later than thirty days after the opening of proposals. The deposit will be forfeited if the documents are not returned within thirty days.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman

New York, April 19, 1956

Bids: May 1, 1956

Port of New Orleans

ADVERTISEMENT

Sealed bids will be received by the Board of Commissioners of the Port of New Orleans at their office, Room 204, No. 2 Canal Street, until Tuesday, May 1, 1956, at 2:00 o'clock P. M., and then publicly opened for furnishing 6000 to 15000 tons of steel bearing piles.

Deposit of three per cent of the sum bid, by certified check only, certified by an accredited officer of an accredited bank, is required with each bid.

A surety bond, in acceptable surety company, in the amount of the contract, is required with notarial contract.

Specifications and bid forms are on file in the Board's office mentioned above. Complete sets will be furnished to prospective bidders on application.

The right is reserved to accept or reject any or all bids and to waive informalities, and to award a contract or contracts as the Board may determine to be for its best interests.

Prequalification Bids: April 24, 1956.

Board of Education
Bureau of Construction

Notice Re Prequalification Forms for Contractors

NOTICE IS HEREBY GIVEN THAT THE Director of the Bureau of Construction, Room 407, 4th Floor, 42-15 Crescent Street, Long Island City 1, New York, will receive applications for prequalification of bidders, from contractors who may wish to submit bids for the proposed hereinafter specified contracts, as follows:

For general construction, plumbing and drainage, heating and ventilating, electrical work and lighting fixtures for a new Addition to P.S. 251, Brooklyn, Avenue "I" and East 54th Street.

Prequalification application forms will have to be secured from and must be submitted to the Director, Bureau of Construction Office, 4th Floor, Room 407, 42-15 Crescent Street, Long Island City, New York.

Bids when advertised will be received from prequalified bidders only.

The time for submitting prequalification application forms for the above contracts will expire on Tuesday, April 24th, 1956.

WILLIAM H. CORREALE
Director

Dated: April 5, 1956

Bids: May 8, 1956

Contract NYA-650.034

ADVERTISEMENT
THE PORT OF NEW YORK AUTHORITY
NEW YORK INTERNATIONAL AIRPORT
PARKING FIELD

Sealed proposals for the construction of paving and the furnishing and installation of utilities for a parking field at New York International Airport will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, May 8, 1956, at which time said proposals will be opened and read in Room 1108.

Contract documents may be seen at the office of the Engineers of Design of the Authority, Room 1112. Documents will be furnished upon deposit of $30.00 per set for not more than three sets to any one company (each set including one copy of the contract drawings). Additional sets will be furnished upon payment of $30.00 per set, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt in duplicate will be issued. A copy of the receipt shall be delivered to Room 1112, where the documents will be furnished.

Those who have submitted a bid on the contract will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman

New York, April 19, 1956

Bids: May 8, 1956

Contract NA-360.001

ADVERTISEMENT
THE PORT OF NEW YORK AUTHORITY
NEWARK AIRPORT
HIGH PRESSURE WATER SUPPLY FOR
HANGAR NO. 12

Sealed proposals for the furnishing and installation of a high pressure water supply for Hangar No. 12 at Newark Airport will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, May 8, 1956, at which time said proposals will be opened and read in Room 1108.

Contract Documents may be seen at the office of the Engineer of Design of the Authority, Room 1112. Documents will be furnished upon deposit of $30.00 per set for not more than three sets to any one company (each set including one copy of the contract drawings). Additional sets will be furnished upon payment of $30.00 per set, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt in duplicate will be issued. A copy of the receipt shall be delivered to Room 1112, where the documents will be furnished.

Those who have submitted a bid on the contract will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman

New York, April 19, 1956

Bids: May 7, 1956

Town of Millinocket, Maine

Sealed bids will be received on or before May 7, 1956, for road and sewer construction. Work will be divided into sections, which may be bid separately or combined. Approximate principal items are sewerage —6300 lin. ft. in Section A, 5500 lin. ft. in Section B, and 3250 lin. ft. plus 1000 gpm pumping plant in Section C. Plans, specifications, etc., are obtainable on $5.00 deposit from Selectmen, Town of Millinocket, at Millinocket, Maine.

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4679) will be received at Glendo, Wyoming, until May 22, 1956, for furnishing labor and materials for Access Road Tunnel, Fremont Canyon Power Plant, Glendo Unit Missouri River Basin Project, Wyoming. Location approximately 40 miles southwest of Casper, Wyoming. Principal items are 25,600 cu. yds. excavation in open cut; 18,000 cu. yds. excavation for tunnel; 160 cu. yds. concrete in tunnel portals; 550 cu. yds. gravel or crushed rock surfacing; and other work. Completion time 330 days. For particulars, address Bureau of Reclamation, P. O. Box 127, Glendo, Wyoming; or Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

HIGHWAYS AND BRIDGES

Designers — **Draftsmen**
Resident Engineers — **Field Engineers**
Soils Engineers — **Inspectors**

Openings available in New York State and New England. Send resume, including Education, Experience, Availability and Salaries in application letter.

FRANK L. EHASZ
CONSULTING ENGINEER
40-29 27th Street
Long Island City 1, N. Y.

HIGHWAY ENGINEERS
DESIGNERS - DRAFTSMEN - SURVEYORS
Expanding Highway Program
Permanent Positions Depending on Ability
Send Complete Resume and Availability

ROBERT W. LOWRY
Consulting Engineers
227 PINE ST. HARRISBURG, PA.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Two college teachers to teach mechanics and/ or civil engineering subjects other than structural. Salary and rank dependent on qualifications. Location Northern New York. P-1137, Engineering News-Record.

A new general engineering construction company now being organized in California requires a construction executive with ability to develop a sound producing company. Applicant must have engineering degree, necessary field and office experience and have thorough knowledge of business. Salary open to right person. P-1268, Engineering News-Record.

Positions Available for New York State Residents City of New Rochelle, N. Y. Assistant city engineer: (competitive) minimum qualifications: Degree in civil engineering from accredited college or university and 8 years public works engineering experience. Salary $6130-$7870. Must be New York State registered professional engineer. Junior engineer (competitive) minimum qualifications: degree in civil engineering from accredited college or university, or high school graduate plus acceptable equivalent combination of education and experience. Salary $3920-$5040. These positions carry three weeks vacation, sick leave, hospitalization, New York State Retirement System. Apply to Department of Personnel & Budget, City Hall, New Rochelle, N. Y. Telephone: NE 2-2021.

Job Superintendent for multimillion dollar shopping center; other jobs to follow. Give full details first letter to 2530 Woodville Rd., Toledo, Ohio.

Pipefitter Superintendent for large paper mill expansion program in Ontario. Send resume of experience, salary expected and recent picture. Write P-1302, Engineering News-Record.

Petrographer: Experienced in mineralogical and petrographic examination of cement, concrete and concrete aggregates to work in laboratory of consulting engineers. Write fully regarding experience, education, date available and salary required. Midwest location. Permanent. P-1289, Engineering News-Record.

Project Engineers with experience in estimating for immediate employment in the Southeast. Must be capable of assuming responsibility. Send resume and photo to McKoy-Helgerson Company, Box 57, Greenville, S. C.

Wanted Superintendent for stripping job. Middlewest Area, rock & dirt excavation, understands large draglines operation and maintenance, give age, experience, references, salary first letter, confidential. Mary Construction Co., Inc., P. O. Box 425, Cape Girardeau, Missouri.

Engineers: Experienced highway, bridge, drainage, design, draftsman and other positions available. Submit complete resume. Interview will be arranged. Reply P-1151, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Illinois.

(Continued on page 166)

EMPLOYMENT OPPORTUNITIES

The Advertisements in this section include all employment opportunities—executive, management, technical, selling, office, skilled, manual, etc.

Positions Vacant — **Civil Service Opportunities . . .** — **Employment Agencies**
Positions Wanted — **Selling Opportunities Wanted** — **Employment Services**
Part Time Work — **Selling Opportunities Offered** — **Labor Bureaus**

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GRADUATE CIVIL ENGINEERS or ARCHITECTURAL ENGINEERS

Major Southwestern general contractor needs engineers for work in estimating dept. Job requires investigation and take off and can also lead to field work depending on interest of employee. Excellent opportunity for young men to obtain desirable position with reliable firm doing all types of construction work. Have openings in El Paso, Dallas, and Los Angeles offices.

ROBERT E. McKEE
GENERAL CONTRACTOR, INC.
PO BOX 562 EL PASO, TEXAS

MATERIALS ENGINEER

Graduate with strong background in soils, asphalt and concrete testing.
Overseas—single status.
Very high earnings.

METCALF & EDDY
and
ALFRED HOPKINS & ASSOCIATES

334 Boylston — **346 Broadway**
Boston, Mass. — **New York, N. Y.**

ANTARCTIC VEHICLE MECHANICS

Mechanics are needed in connection with International Geophysical Year expeditions to Antarctica. Vehicles used will be light, tracked units: Tucker Sno-Cats and U. S. Ordnance weasels. Tours are November 1956 to March 1958 and November 1957 to March 1959. Interested personnel should write *A. P. Crary, USNC-IGY Office, 1145 19th St. N. W., Washington, D. C.*, giving experience and desired salaries.

SPECIFICATIONS WRITER

A leading international industrial engineering company has immediate opening available for an experienced building specification writer.

Applicants should possess at least five years experience writing building specifications for material purchases and subcontract specification for all building trades.

This is a permanent position offering good starting salary, all fringe benefits, good working conditions, high management cooperation, and opportunity for advancement.

Please submit a complete resume stating education, experience, salary requirement, and earliest date available to:

The H. K. FERGUSON COMPANY
ENGINEERS AND BUILDERS
1783 East 11th St., Cleveland 14, O.

AUTOMOTIVE ENGINEER

Graduate M.E. with minimum 5 years' experience involving design, selection or preparation of specifications for the construction and use of heavy, medium and light off-road automotive equipment. For work in Company's Equipment Engineering Department. Will prepare specifications for manufacture, economic and engineering analysis for selection and guidance for tests and inspection of purchased equipment. Salary commensurate with qualifications.

Write outlining personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 132

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

ENGINEERS - GEOLOGISTS - TECHNICIANS - INSPECTORS

Experienced in concrete—soils—asphalt paving.

Industrial and Highway Projects.

Openings in several grades, including opportunities for engineers and geologists (P.E. registration).

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TOLEDO 2, OHIO

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And many other openings.

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OVERSEAS PROJECT

P-1350, Engineering News-Record
330 W. 42 St., New York 36, N. Y.

INSPECTOR ENGINEER

Graduate Mechanical Engineer with minimum 3 years' experience in work involving thorough knowledge of the materials and equipment used for oil producing, refining and supporting facilities. Knowledge A.P.I. and A.S.M.E. and other production codes required. For New York office, however, job requires extensive travel throughout the U. S. to inspect and approve purchased equipment and materials.

Salary commensurate with education and work experience. Liberal benefit program. Write outlining personal history and work experience.

Recruiting Supervisor, Box 114

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, N. Y.

ENGINEERS DESIGNERS DRAFTSMEN

Permanent openings in our St. Louis and San Francisco offices for qualified personnel experienced in design of structural steel and reinforced concrete for work on

BRIDGES & BUILDINGS
HYDROELECTRIC PROJECTS
INDUSTRIAL FACILITIES

Openings also available for mechanical and electrical designers and draftsmen for work on power plants, test facilities, large electrical installations and general industrial projects. Several recent graduate engineers will be added in all categories.

We desire men who want long range employment with ample opportunity for professional development and advancement. Excellent Employee Benefits & Retirement Plan, generous annual leave and sick leave, Blue Cross, paid holidays.

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Engineers — Architects
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With extensive experience all types sewers, water mains, general heavy underground construction within N. Y. State. We require top notch foreman —not job superintendent. Permanent position for qualified person able to justify good salary.

P-1223, Engineering News-Record
330 W. 42 St., New York 36, N. Y.

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Long established firm of consulting engineers with world-wide practice needs both beginners and experienced civil engineers and draftsmen for interesting work on large dams, powerplants, river control works and highways. Permanent positions. Liberal employee benefits. Starting salaries dependent on qualifications. Please send complete resume to Hugo Niemi, Personnel Mgr.

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Permanent Positions for Experienced Men and New Graduates in our CINCINNATI, OHIO, and LANSING, MICHIGAN, Offices.

Paid vacations and holidays, insurance and retirement plan.

Please give detailed personal and experience record, references and salary expected in application letter.

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Excellent opportunity in Southern California in private business. One of our engineers is retiring on pension after twenty years service. The man who will replace him should have a general design and construction experience in the development of general survey, earth moving, sewerage, drainage, water supply, street and miscellaneous small to medium concrete and steel construction projects. Age 30-50, family man, Civil Engineering Degree and registered professionally. Good salary and employee benefits with permanent future. Send experience resume to

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OPENINGS At

Rochester, Penna., Harrisburg, Penna., College Park, Md.

ARCHITECTS

Architectural Draftsmen

OPENINGS At

Rochester, Penna.

Send Resume Including Education, Experience, Salary Requirements and Availability TO:

Richard L. Shaw, Personnel Director

Michael Baker, Jr., Inc.
Consulting Engineers
Baker Building Rochester, Penna.

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HYDRAULIC DESIGNERS
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Several qualified men at Project and Senior level in these categories required for international consulting engineering programs of major scope and long duration. Positions available Overseas and on New York City staff.

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Resident Engineer, Field Engineers, Designers and Draftsmen. Pleasant working conditions. Interesting projects. Qualified graduates may apply in person or write fully stating education and experience.

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Openings for highway engineers, draftsmen, detailers, designers and young graduate Civil Engineers interested in future as highway design engineers.

Excellent working conditions. Job security with ample opportunity for advancement. Voluntary employee benefit and retirement plan, generous annual leave and sick leave, Blue Cross, paid holidays.

Send full resume, salary desired and references to

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(Supervisory)

Graduate engineer with minimum 7 years' experience designing, selecting, specifying and or supervising operations of construction equipment, such as crawlers, rubber-tired tractors, shovels, cranes, air compressors, welding machines, pumps, mixers, spreaders, fork lifts, etc.

To consult with manufacturers and suppliers on selection and modification of the above-mentioned equipment. For company's Equipment Engineering Division located in New York City. Salary good; liberal benefits.

Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 89

ARABIAN AMERICAN OIL COMPANY
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Graduate Civil Engineers

Not over 27 and single. Must have military training completed and interested in the building construction business, starting in the field. We offer opportunity for rapid advancement to ambitious, hard-working young men willing to accept responsibility. Starting salary $92.50 per week if unexperienced, with higher wages for those with some experience.

Send complete history data.

Martin K. Eby Construction Co., Inc.
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ENGINEERS DESIGNERS DRAFTSMEN

STRUCTURAL
HIGHWAY
ELECTRICAL
ARCHITECTURAL

Permanent Positions
Available in Florida and Pennsylvania
Excellent opportunities for advancement
Paid Vacation, Sick Leave, Hospitalization

Initial resumé should include experience, education, references and salary requirements

GLACE & GLACE, INC.
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You can fill a desirable *permanent* position in McKee's enlarged Refinery, Metals or Industrial Divisions. Our expansion program gives you excellent opportunity for advancement in one of the world's largest engineering firms.

World-wide McKee operation offers you wide choice in the design of Petroleum Refineries, Chemical Plants, Blast Furnaces, Steel Plants, Sintering Plants and Industrial Plants in the following fields:

PIPING LAYOUT, STRUCTURAL STEEL, CONCRETE, PROCESS HEATERS, EQUIPMENT SPECIFICATIONS, LAYOUT AND PROCESS DESIGN. ALSO PIPING AND ELECTRICAL DRAFTSMEN.

You get top compensation, the security of a life-long pension, paid vacations, benefits of insurance, hospitalization, sick-leave pay and training program.

You'll work with modern equipment in large air-conditioned quarters. Free parking on premises.

Cleveland has attractive residential areas, excellent schools and colleges for you and your family. McKee makes generous transportation and moving allowances.

Write for an interview giving education and experience. No age limitations. All letters kept strictly confidential. Write today to:

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A leading engineering and construction company with headquarters located in Midwest, has immediate opening available for a Civil Engineering Graduate with some traffic or highway experience, including drafting chart work and technical reports. Must be willing to travel throughout the United States and Canada.

Good starting salary, plus many company benefits, including group life insurance and hospitalization program, paid vacation and holidays, and sick leave accrual plan.

Please submit complete resume, stating education, experience, salary requirements and earliest date available to:

THE H. K. FERGUSON COMPANY
Engineers and Builders
1783 East 11th St. Cleveland 14, Ohio

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Design experience in one or more of the following fields:
Instrumentation and controls for Industrial Equipment, Refinery and Chemical Plant Processes, Steam Power Plants, Materials Handling Equipment, Metallurgical Process Equipment such as metallurgical furnaces, kilns, crushers, or related heavy machinery, heating and ventilating, or industrial plant layout.

ELECTRICAL —
Responsible design experience on panel boards, industrial controls, power distribution or lighting.

STRUCTURAL —
Design or detailing experience in structural steel and/or re-inforced concrete for industrial projects.

PIPING —
Designers with drafting and layout on high temperature high pressure piping.

Immediate openings in our SAN FRANCISCO offices for men with above stated job experience.

BECHTEL CORP. is a progressive engineering and construction firm engaged in world-wide operations.

LIBERAL RELOCATION ALLOWANCES COVERING APPLICANTS, FAMILY & HOUSEHOLD EFFECTS

BECHTEL
Engineers - Constructors

Send Resume:
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Confidential interviews can also be obtained at: Scanlon Building, Houston, Texas, or Roosevelt Building, Los Angeles, Calif.

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PAID VACATION, SICK LEAVE HOSPITALIZATION, LIFE INSURANCE
INCLUDE EDUCATION, EXPERIENCE, REFERENCES AND SALARY EXPECTED IN APPLICATION LETTER

Howard, Needles, Tammen & Bergendoff
1805 GRAND AVE. KANSAS CITY 8, MO.

POSITIONS VACANT

(Continued from page 163)

Engineers experienced in design and supervision of construction to work as resident engineers or prepare plans for water and sewer systems. Also architects for preparation of plans for general building work. State experience, age, salary required, when can report, and give references. Reply P-1398, Engineering News-Record.

Engineer—Structural Steel Sales Promotion we are searching for a young Civil Engineer, preferably under 30, to handle technical and promotional work with customers of the structural steel fabricating industry. Headquarters will be in our regional office at Dallas, Texas. Some travel through Texas, Louisiana and New Mexico required. Applicants should have a B.S. in C.E. and preferably be registered. Experience in steel design and construction desirable. Salary open, depending upon experience. Insurance and retirement plans available. Send complete resume, recent photo if available, and salary requirements by mail to American Institute of Steel Construction, Inc., 101 Park Ave., New York 17, New York.

Municipal consultant and land surveyor in Detroit area wants chiefs of party. Land surveyor, minimum 3 years experience, registered preferred. Construction layout party chief. Salaries commensurate with ability—$6,300-$7,500. P-1361, Engineering News-Record.

Architects' Superintendent of Construction excellent permanent opportunity with progressive firm for man qualified to supervise construction, coordinate trades, check materials, interpret plans, etc. Start immediately on large central Illinois school—2 years duration. State references, age education, experience, salary requirements. Atkins, Barrow & Associates, 102 East Main Street, Urbana, Illinois.

Designer-Draftsman with minimum of five years experience in sewage works who desires responsibility. Salary open. P-1383, Engineering News-Record.

Wanted: Chief engineer for foreign service. Internationally known contractor to 50 years of age. Must have extensive experience in heavy construction as chief engineer or project manager. Should have experience negotiations with client and government officials. Civil engineering degree desirable. P-1392, Engineering News-Record.

Engineers Grade III (Registered) to $7,951; Grade II to $6,502; grade level and salary dependent upon experience in the design of streets, sewers, sanitary constructions, and illumination field. 40 hr. wk. Paid vacation, sick leave, group life insurance. $2,600 pension after 25 yrs. Write to Department of Personnel, City Hall, Dearborn, Mich.

Wanted: Surveyor or Engineer capable of doing layout work for air base paving and grading work. Also must be familiar with doing own computations and cross sectioning of volumes. Located in Texas and Oklahoma. P-1404, Engineering News-Record.

Civil Engineer with several years experience in site work including layout of roadways, parking lots, sewers, sewage disposal systems, etc. Permanent connection. Eberle M. Smith Associates, Inc., architects-engineers, 153 East Elizabeth Street, Detroit, Michigan. Woodward 5-8180.

Position open for Chemical Engineer between 30 and 40 years of age. Must be capable of supervising all phases of pilot plant operations. Location Southwest U.S.A. Salary open. P-1413, Engineering News-Record.

Mechanical Engineer with several years experience in design of heating, ventilating, air conditioning, and plumbing. Excellent opportunity. Permanent connection. Eberle M. Smith Associates, Inc., architects-engineers, 153 East Elizabeth Street, Detroit, Michigan. Woodward 5-8180.

EMPLOYMENT SERVICE

Salaried personnel, $5,000-$30,000. This confidential service, established 1920, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. L, P. O. Box 671, Manchester, Vermont.

POSITIONS WANTED

Treasurer Controller—Over twelve years senior administrant of consulting engineering and construction contracting acctg. high level experience includes financing, insurance, job costs, taxes & claims. Proficient in the preparation of concise reports. Prefer New York City area. PW-9410, Engineering News-Record.

POSITIONS WANTED

Registered Engineer, building construction executive, qualified to design, estimate, manage complete project, or manage branch office. Salary bracket $15,000 year. PW-1138, Engineering News-Record.

Construction Manager—25 years experience. Seeks position as manager, superintendent or estimator with building contractor. PW-1158, Engineering News-Record.

Construction Superintendent and engineer desires work in New England. Experienced industrial, building, marine and heavy construction, housing, road structures and drainage. PW-1325, Engineering News-Record.

Construction Supt. available for large project or several small ones. Prefer Georgia, Florida or West Indies. G.M.C. Lucas 2225 Wisteria St., Sarasota, Florida.

Civil Engineer. M.S., Reg. Pa., 35. Five years designer on procedure and equipment for large steel erector, 2 years pile foundation construction. Desires contractor or engineering office with opportunity to broaden experience and responsibility. PW-1327, Engineering News-Record.

POSITIONS WANTED

Construction Supt: 25 years experience in industrial and commercial building. Prefer work in East. PW-1173, Engineering News-Record.

Construction Executive, buildings and heavy construction, sound experience bid to completion, qualified to manage a project, branch office or a business, seeks new connection where top man is required. Minimum $15,000. PW-8792, Engineering News-Record.

Construction Supt or Assist experienced in heavy construction, excavation demolition, shoring, underpinning concrete foundation work, utilities. Available in a few weeks. PW-1414, Engineering News-Record.

Experienced building estimator, 30, married. 9 years experience with one contractor. Proven performance record in bidding, purchasing and job management. Includes 2½ years as project manager on two multi-million dollar projects. Desires responsible position with opportunity to advance with general contractor. PW-1416, Engineering News-Record.

Mechanical Engineer—10 years field experience with maintenance and operation of heavy construction equipment, concrete & earthmoving, age 34, 4 languages, ability to organize personnel, desires position in heavy construction. PW-1361, Engineering News-Record.

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(Classified Advertising)

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FOR SALE

Lima Model 802 Crane-Dragline

Model D-1700 Caterpillar Engine, Oversize cats, full accessories.

George A. Bass Construction Co.
Birmingham, Michigan

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CATERPILLAR D-4 TRACTOR #6U11024. New September, 1955, used 635 hours on light work. Clean and mechanically perfect.

LAKE STATES ENGINEERING CORP.
53 W. Jackson Blvd. Chicago 4, Ill.
Phone: WAbash 2-3450

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Surplus New & Used
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PILING · PILE FITTINGS · PIPE
CULVERTS · VALVES & FITTINGS
SPECIALISTS IN PRE-FAB. PIPING

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PIPE
VALVES and FITTINGS
All Sizes in Stock
NEW-USED
GREENPOINT IRON & PIPE CO., INC
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Engineers—Foremen—Office Men

Learn latest methods to organize and run work. Prepare for the top jobs.
Send post card for details.

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CONSTRUCTION CONSULTANTS
P.O. Box 921 Lake Worth, Florida

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. 36)
CHICAGO: 520 N. Michigan Ave. 11)
SAN FRANCISCO: 68 Post St. 4)

BUSINESS OPPORTUNITIES

M.E. preparing European trip. Will survey-report markets your product. BO-1346, Engineering News-Record.

Sand and Gravel plant with transit mix set up, in Suffolk County for sale. BO-1379, Engineering News-Record.

$100,000 required for expansion of growing tractor parts business. Eastern states. Rapid turnover. Excellent return. Will consider one or several investors. BO-1397, Engineering News-Record.

WANTED
Complete Pull Shovel Attachment
To Fit Osgood Model 810
· Will consider
36" cutting width bucket
42" cutting width bucket
SOMMER BROS. CONSTRUCTION CO., Inc.
15 West 18 Street New York 11, N. Y.
WAtkins 4-3809

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ARCHITECTURAL ENGINEERING
OUR COURSES of instruction by mail HAVE HELPED THOUSANDS to better positions and to pass State Board Examinations Forty third year
Write today—without obligation
WILSON *Engineering Corp.*
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YOUR OPPORTUNITY!

UNUSED Army Trucks
2½, 3½, 5-ton

GMC-DIAMOND T & INTERNATIONAL 6x6's

- *From Government Storage!*
- *Unused and Guaranteed!*
- *Factory-New Condition!*
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- *Reconditioned Trucks Also Available!*

Tandem axle trucks with front wheel drive, 10 forward speeds, overdrive, brand-new mud and snow tires. Carry maximum loads, give extra power you need in "rough going" . . . at LESS, often half the COST of conventional new trucks.

For Specifications, Prices, Delivery:

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Sales Manager

MEMPHIS EQUIPMENT Company
CONSTRUCTION AND AUTOMOTIVE EQUIPMENT AND PARTS
766 SO. THIRD ST. MEMPHIS, TENNESSEE

USED CONSTRUCTION MACHINERY

Caterpillar D-7 Tractor with 7S Hyd. straight dozer. Reconditioned	$14,000.00
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Michigan C-16 Crawler Backhoe	$ 6,500.00
Caterpillar #12 Motor Grader, scarifier, Hyd. steering booster, large front tires, 1765 hours. Excellent	$11,500.00
Caterpillar #112 Motor Grader, scarifier, Hyd. steering booster, large front tires. Condition—like new	$11,750.00
Buckeye 406 Trencher, G.M. Diesel Power, 17½" buckets. Excellent condition and appearance	$ 6,500.00

We are continually receiving good used trade-ins. Send us your inquiries. Full facts and photos by return mail.

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MElrose 1-2567

FORSYTHE EQUIPMENT CO., INC.

MANITOWOC SPEEDCRANES

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Capacities to 70 Tons
Booms to 140 ft. and 30 ft. jibs.
Special rates on long rentals

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Complete parts are available for Sterling, Jaques and other make earth boring machines. We completely rebuild and repair all makes diggers in our well equipped shops.

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Model TS-300

These machines are in very excellent condition.

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FOR SALE:

Generator Set, stationary or portable, 6-71 G. M. Diesel, 75 KW-938 KVA 3-phase 60-cycle 220-volt generator complete, with all panels. Used only as stand-by and equal to new.
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1—1½ yd. HI Discharge Rex Truck Mixers only. Excellent condition.
Price — $950.00 ea.

2—1½ yd. Horizontal Rex Truck Mixers. Excellent condition.
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Price — $1950.00

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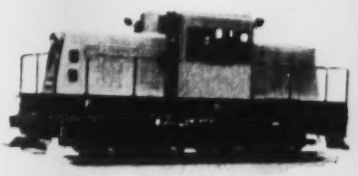
Riverhead, L.I., N. Y.
PArk 7-4177



50 T. PORTER DIESEL ELECTRIC LOCOMOTIVE, new '41, ser. #7300 cl; 150 HP Cummins Engines (total 300 HP') used 1 yr; excellent $19,750.

ALSO

Diesel Electric locomotives, standard gauge, 25-45-50-65-80-105 tons. 25-40-30-35 tons Ohio, Orton, Brownhoist locomotive Cranes.

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1—1 Yd. Digging Bucket
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200D Pumpcrete complete with 8" pipe. Excellent condition. Ready for immediate work.

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One 25 Ton 3 Sheave Steel Stiff-leg Derrick 38' Mast 85' Boom & Bull Wheel

PRICE $2500.

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PILE SECTIONS
NEW · USED · IN STOCK

8" B P	36#	19/35'
10" B P	42#	45/50'
12" B P	53#	60/65'
14" B P	73#	60/65'
14" B P	89#	60/65'

We are also interested in purchasing your surplus material.

We assure you our prices will be the best obtainable.

Call **HY DRACHMAN**
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Top-Condition erection cranes
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World's Best Rebuilts

55' Lindsey	(2) wheels	
60' Worth. or LeRoi	(2) wheels	
70' Smith	(2) wheels	
75' Worth.	(2) wheels	(5)
105' Worth.	(2) wheels	
105' Worth.	(4) wheels	
125' Worth.	(2) wheels	
105' Joy	(2) wheels	
105' Sullivan	(4) wheels	
120' Smith	(2) wheels	
210' Worth.	(4) wheels	(3)
315' Worth. Diesel	(4) wheels	
315' Jaeger Diesel	(4) wheels	
500' Worth. Diesel		(4)
600' Worth. Diesel		(5)
630' Joy Diesel		(3)

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AIR COMPRESSOR CORP
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Telephone UNion 5-4848

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Blaw Knox Mixing & Batching Plant, 900 yd. capacity. Two 2 yd mixers.
200 ton American Guy Derrick 160' Bm.
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50 ton Whitcomb Diesel Elec. Loco. 1943.
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Used 13 yd. bottom dumps
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6' x 22" Hardinge Conical Ball mill
Rotary Steam Tube Dryer—4' x 30', 6' x 40'
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Hoists, Cranes, Conveyers
We pay for your surplus; send us your listings

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DIESEL ELECTRIC LOCOMOTIVES
STANDARD GAUGE
25 - 35 - 40 - 50 - 65 - 75 - 100 tons
and
6 Alco - 1950 - 1500 H.P.
2 Alco 115 ton - 900 H.P. 0-4-4-0
8 wheel
Write for Details
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80 TON G.E. DIESEL-ELEC.
500 H.P.—CUMMINS ENGINES
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6—Nearly New Blaw-Knox 8-yard air-operated, clam-gate Concrete Buckets.
1—Fuller single, stationary Fluxo Cement Pump No. 265.

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STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton — 18" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Pennsylvania

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TRACK ACCESSORIES
NEW and RELAYING

RAILS
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NEW—RAILS—Relayers
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RAILS
NEW — RELAYING — TRACK ACCESSORIES
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IMMEDIATE DELIVERY

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American Bridge Div., U. S. Steel Corp. .. 141
American Cable Div., American Chain & Cable Co. ... 157
American Foreign Ins. Assoc. ... 79
American Manganese Steel Div., American Brake Shoe Co. ... 106
American Road Equip. Co. ... 104
American Steel & Wire Div., U. S. Steel Corp. ... 154, 155
American Surety Co. ... 112
Armco Drainage & Metal Products, Inc. ... 41

Bakelite Co., Div. of U. C. C. ... 159
Bayley Co., The Wm. ... 123
Belmont Iron Works ... 118
Bethlehem Steel Co. ... 124
Blaw Knox Equip. Div., Blaw Knox Co. ... 15
Blood Brothers Machine Co. ... 128
Boston Woven Hose & Rubber Co. ... 36, 37
Bruning Co., Inc., Charles ... 73
Byers Co., A. M. ... Second Cover

Caterpillar Tractor Co. ... 31
Chevrolet Motor Div., G.M.C. ... 139
Cleveland Tramrail Div., Cleveland Crane & Engineering Co. ... 80
Clow & Sons, James B. ... 72
Clyde Iron Works, Inc. ... 102
Columbia Southern Chemical Corp. ... 121
Concrete Grinding Corp. ... 136
Concrete Reinforcing Steel Institute ... 137
Craftsman Book Co. of America ... 94

John Deere Corp. ... 109
Detroit Diesel Engine Div., G.M.C. ... 135
Dewey & Almy Chemical Co., Div. W. R. Grace & Co. ... 60, 61
Dicalite Div., Great Lakes Carbon Corp. 122
Dresser Mfg. Div., Dresser Ind. ... 45
Dudgeon, Inc., Richard ... 118

Eastman Kodak Co. ... 91

Fairbanks-Morse Co. ... 112
Fenestra Inc. ... 55
Ford Motor Co., Industrial & Engine Div. ... 6
Fort Pitt Bridge Works ... 147
Frederick Iron & Steel Corp. ... 110
Frederick Post Co. ... 82

General Electric Co., Electronics Dept. .. 117
General Electric Co. ... 70, 71
Goodall Rubber Co. ... 74
Goodyear Tire & Rubber Co. ... 20
Grace Mfg. Co., W. E. ... 133
Griffin Wellpoint Corp. ... 112
Gunite Concrete & Construction Co. ... 100

Hamilton Kent Mfg. Co. ... 17
Henderson Mfg. Co. ... 30
Hetherington & Berner, Inc. ... 118
Hope's Windows, Inc. ... 96

Inland Steel Prod. Co. ... 78
Insurance Co. of North America ... 65
International Harvester Co. (Trucks) ... 127
International Trading Corp. of Virginia 110
Intrusion-Prepakt, Inc. ... 131
Irving Subway Grating Co. ... 89

Johns-Manville Corp. ... 92

Kaiser Aluminum & Chemical Corp. ... 75
Kern Instrument Co. ... 158
Kerrigan Iron Works, Inc. ... 54

Layne & Bowler, Inc. ... 153
LeRoi Co. ... 114
LeTourneau, Inc., R. G. ... 138
LeTourneau-Westinghouse Co. 95, 97, 99, 101
Lone Star Cement Corp. ... 22
Lukens Steel Co. ... 150

Madesco Tackle Block Co. ... 104
Madsen Iron Works, Inc. ... 142
Maginniss Power Tool Co. ... 46
Manumine Research & Development Co. ... Third Cover
McKiernan-Terry Corp. ... 132
Murphy Diesel Co. ... 1

National Steel Corp., Stran Steel Div., Great Lakes Steel Co. ... 76
National Tube Div., U. S. Steel Corp. 12, 13
Noble Co. ... 113
Northwest Engineering Co. ... 3

Penn Dixie Cement Corp. ... 7
Pennsylvania Drilling Co. ... 100
Perlite Div., Great Lakes Carbon Corp. .. 119
Permacrete Products Co. ... 62
Phoenix Bridge Co. ... 128
Pittsburgh-Des Moines Steel Co. ... 8, 9
Pittsburgh Plate Glass Co. ... 68
Posey Iron Works, Inc. ... 120
Preload Corp. ... 30
Presstite Keystone Engineering Products Co. ... 103

Ramset Fasteners, Inc. ... 93
Raymond Concrete Pile Co. ... 149
Reo Motors, Inc., Industrial & Marine Engine Div. (Insert) ... 85-88
Richmond Screw Anchor Co., Inc. ... 77
Rust-Oleum Corp. ... 105
Ryerson & Sons, Inc., Jos. T. ... 18

St. Paul & Tacoma Lumber Co. ... 69
Sauerman Brothers, Inc. ... 84
Servicised Products Corp. ... 115
Sika Chemical Corp. ... 83
Skidmore Wilhelm Mfg. Co. ... 94
Smith Co., S. Morgan ... 90
Smith Engineering Works ... 11
Sonneborn Sons, Inc. ... 53
Spencer, White & Prentis, Inc. ... 104
Sprague & Henwood, Inc. ... 128
Stacor Equip. Co. ... 125
Standard Dry Wall Products ... 107
Stow Mfg. Co. ... 111
Symons Clamp & Mfg. Co. ... 2

Taller & Cooper, Inc. ... 48
Tapecoat Co. ... 116
Templeton Kenly & Co. ... 66
Texas Co. ... 4, 5
Thor Power Tool Co. ... 32
Thurman Machine Co. ... 130
Timken Roller Bearing Co. ... Fourth Cover
Truscon Laboratories ... 34
Tube Turns, Inc. (Insert) ... 49, 50

Umeco Optical Div. ... 110
Union Wire Rope Corp. ... 56, 57
United Steel Fabricators, Inc. ... 98
Universal Builders Supply Co. ... 144
Universal Mfg. Co. ... 16

Vulcan Iron Works ... 35

Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp. (Insert) .. 67
Wisconsin Motors Corp. ... 100

Yeomans Brothers Co. ... 81

Professional services ... 170

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F. J. Eberle, Business Mgr.

Employment Opportunities ... 163-166
Educational ... 166
Proposals ... 160-170
Equipment (For Rent, Sales Wanted) ... 166-170

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Editorials

Practical Plastic Design of Steel Coming

A NEW DESIGN TOOL FOR STEEL FRAMING is in the making. Not yet fully fashioned, it can be wielded safely now only by research analysts. But there is promise that rules may be formulated within a year to permit its use by anyone who can design a steel beam. The new tool is called plastic design—sometimes also, ultimate-strength, ultimate-load or limit-load design.

At present, structural steel is designed mostly by the elastic theory. Yield-point stress is divided by a safety factor to obtain a working stress, and members are proportioned so that this stress is nowhere exceeded. For many types of steel structures, particularly continuous beams and frames, this procedure is wasteful. It ignores the great ductility of steel, which permits redistribution of stress from overburdened to underloaded elements.

In contrast, plastic design provides a means of calculating the actual load-carrying capacity of a frame. When the ultimate load has been computed, a safety factor is applied to it to determine the safe working load. Under that load, stresses will be in the elastic range, just as for structures designed by the elastic theory, but generally will be greater than elastic-theory stresses. Deflections, however, will not be any larger usually for the plastic continuous members than for simple beams designed by elastic theory.

As highlighted at an engineering conference of the American Institute of Steel Construction (ENR April 12, p. 24), tests made as a part of a ten-year research program at Lehigh University verify the accuracy of plastic theory for structural steel. In addition, there is indication that plastic design of continuous structures may actually be easier than design by elastic theory.

Some economies made possible by plastic design are obvious; for example, changing from simple beams to continuous, to begin with, and then applying plastic design to employ even lighter members. What may not be so obvious are savings that can be made in fabrication and erection. Design by elastic theory, for instance, often requires heavier sections at the ends of continuous beams than at midspan, whereas plastic design makes feasible efficient use of constant-section beams in continuous construction.

To get the maximum benefit from plastic theory, however, engineers may have to discard many design limitations imposed by elastic theory. Some designers, for example, have avoided use of continuous beams because the plastic theory indicated settlement of supports would cause high stresses; some have introduced settlement "to relieve" continuity stresses. But the plastic theorist contends that if the settlement is not very large, it has no effect on the carrying capacity of the beams. Another common assumption is that members should be proportioned in accordance with the stress pattern produced by working loads. With plastic design, this may not result in the most economical design; members can be shaped to make the structure behave the way the designer wants, since he can cause plastic hinges to form under limit loads at advantageous locations by decreasing the dimensions of appropriate sections.

Making this new design tool available for practical use now awaits only formulation of design rules. It is to be hoped that the delay will be short.

Remarkable Japanese Construction

JAPANESE DAMBUILDERS DESERVE GREAT PRAISE for their work on the Sakuma Dam, described elsewhere in this issue. In a country known for its concern with "face", the Japanese thrust aside deep-rooted traditions and procured the services of American advisors and U. S. heavy equipment. They then proceeded to outdo their stateside teachers—the same men who operated the very same equipment at Pine Flat Dam—in challenging world records in tunneling and placement of concrete.

In a recent editorial on this page (ENR Mar. 29, p. 96), discussing tunneling records, an error occurred which deprived the Swedes of the new world mark they set on their 49x59-ft Harresele Tunnel. There, a 1,410-sq ft top heading was advanced 22½ ft a day, for a total volume removed of 31,725 cu ft, rather than the 27,354 cu ft reported. The new figure takes over world leadership from the 30,750 cu ft removal in Australia's 24-ft-dia Eucumbene Tunnel.

Now the Japanese have come along to take second place by removing 30,810 cu ft per day from one of the 37-ft-dia diversion tunnels at Sakuma. And had not a 6x8-ft pilot drift been driven—whose entire volume has been deducted—it is probable that the Japanese could have laid claim to a new world's record. It is significant also that the Japanese are now in second place on the basis of volume removed per driller—2,055 cu ft per day compared to the Australian record of 2,562 cu ft.

It is difficult to assess the concreting volumes achieved by the Japanese at Sakuma in terms of a world record or even in comparison to the Guy F. Atkinson Co.'s output at Pine Flat Dam using the same two cableways. Atkinson used the standard 25-ton cableway for service operations while placing a maximum 4,000 cu yd in 24 hours from the high-speed rig. Using both cableways, the Japanese placed 6,775 cu yd in a 24-hour period, presumably most of this amount with the high-speed unit. Thus, it appears that by any method of evaluation, the Japanese outdid their American tutors. Incidentally, the high-speed cableway at Pine Flat was powered by four 250 hp dc motors, which were called upon for about 400 hp most of the time. Four 450-hp dc motors were used at Sakuma.

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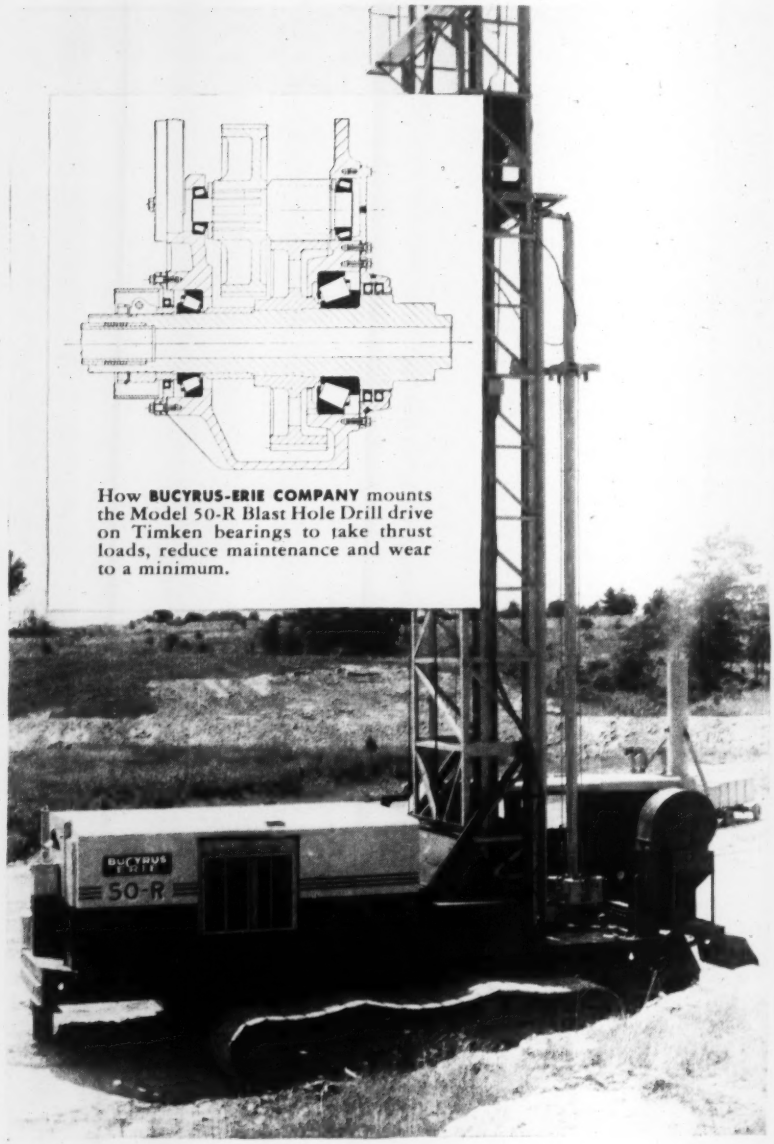


DEVELOPED to meet demands for a big hole rotary blast hole drill, this Bucyrus-Erie 50-R can drill up to 12¼-inch holes with a speed never before possible. To take the terrific thrust loads on the drill bit (up to 30 tons) while drilling hardest quarry formations, and also to maintain accurate gear mesh, Bucyrus-Erie Company mounts the main and intermediate shafts of the rotary drive on Timken® tapered roller bearings.

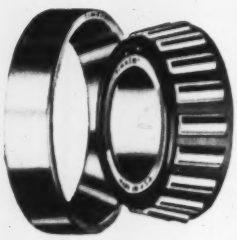
Taking heavy thrust loads is routine for Timken bearings. That's because: 1) The tapered construction enables Timken bearings to take *both* radial and thrust loads in any combination, and 2) Full line contact between rollers and races gives Timken bearings extra load-carrying capacity.

Results show up in many cost-saving ways. With Timken bearings shafts are held in rigid alignment. Gear mesh is smooth and accurate. Shaft wear is eliminated, gear wear reduced. Parts last longer and operate steadily at peak efficiency.

What's more, Timken bearing rollers and races are case-carburized to give them hard, wear-resistant surfaces over tough, shock-resistant cores.

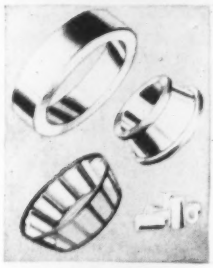
Only Timken bearings give you so many advantages. We even make our own fine alloy bearing steel. We're America's only bearing manufacturer that does. For the most long-lasting, money-saving performance, specify Timken bearings for the machines you buy or build. Look for the trademark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



TIMKEN

TAPERED ROLLER BEARINGS



DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roller ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION